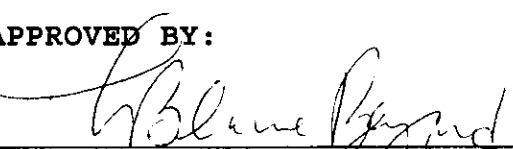


**CITY OF WESTMINSTER**  
**WESTMINSTER, MARYLAND**

**STANDARD**  
**SPECIFICATIONS**  
**FOR**  
**CONSTRUCTION OF**  
**PUBLIC UTILITY SYSTEMS,**  
**ROADS AND STORM DRAINS**

APPROVED BY:



**THOMAS B. BEYARD**  
**DIRECTOR OF PLANNING AND PUBLIC WORKS**  
**CITY OF WESTMINSTER, MARYLAND**

**REVISED**  
**SEPTEMBER, 1997**

**CITY OF WESTMINSTER**  
**WESTMINSTER, MARYLAND**

**STANDARD**  
**SPECIFICATIONS**  
**FOR**  
**CONSTRUCTION OF**  
**PUBLIC UTILITY SYSTEMS,**  
**ROADS AND STORM DRAINS**

**MAYOR AND COMMON COUNCIL**

~~Kenneth A. Yowan, Mayor  
Suzanne P. Albert  
Kevin E. Dayhoff~~

~~Damian L. Halstad, Pres.  
Edward S. Calwell  
Gregory Pecoraro~~

**CITY ATTORNEY**

John B. Walsh, Jr.

**DIRECTOR OF PLANNING AND PUBLIC WORKS**

Thomas B. Beyard

*Sevier*

~~**CITY ENGINEER**~~  
*Michael M. Moss*  
Joseph W. Moss, P.E.

**DIRECTOR OF FINANCE**

Stephen V. Dutterer

## CONTRACT SPECIFICATIONS

### TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u>   | <u>PAGE</u> |
|----------------|--|-------------|
|                | <b>DEFINITIONS</b>                                       | 1           |
| <b>1</b>       | <b>GENERAL CONDITIONS</b>                                | 4           |
| 1-01           | General  | 4           |
| 1-02           | Intent Of Drawings and Specifications                    | 4           |
| 1-03           | Work To Be Done By The Contractor                        | 4           |
| 1-04           | Plans and Specifications Supplementary                   | 4           |
| 1-05           | Construction In Rights-Of-Way And<br>Construction Strips | 5           |
| 1-06           | Protection Of Property And Structures                    | 5           |
| 1-07           | Obstructions Shown On Drawings                           | 6           |
| 1-08           | Removal Of Obstructions                                  | 6           |
| 1-09           | Existing Public Utility Structures                       | 7           |
| 1-10           | Storage Of Materials                                     | 7           |
| 1-11           | Structures To Be Kept Clean                              | 7           |
| 1-12           | Final Cleaning Up  | 8           |
| 1-13           | Guarantee  | 8           |
| 1-14           | Guarantee Bond (Maintenance Bond)                        | 8           |
| 1-15           | Supervision And Direction Of Work                        | 9           |
| 1-16           | Decisions And Explanation By Engineer                    | 9           |
| 1-17           | Material Samples   | 10          |
| 1-18           | Owner May Increase Or Decrease<br>Quantities             | 10          |
| 1-19           | Inspection   | 10          |
| 1-20           | Cooperation Of Contractor                                | 11          |
| 1-21           | Service Of Notices To Contractor                         | 11          |
| 1-22           | Lines, Grades And Elevations                             | 11          |
| 1-23           | Workmanship  | 12          |
| 1-24           | Skilled Labor Only Shall Be Used                         | 12          |
| 1-25           | Alteration Of Plans And Character<br>Of Work             | 12          |
| 1-26           | Tests Of Material Samples                                | 13          |
| 1-27           | Care And Protection Of Work                              | 13          |
| 1-28           | Defective Work   | 13          |
| 1-29           | Claims For Damage  | 13          |
| 1-30           | Unauthorized Work  | 14          |
| 1-31           | Laws And Regulations                                     | 14          |
| 1-32           | Insurance  | 15          |
| 1-33           | Liability Insurance                                      | 15          |
| 1-34           | Permits, Licenses, Charges, Notices                      | 16          |
| 1-35           | Patent Rights  | 16          |
| 1-36           | Water Supply   | 17          |
| 1-37           | Sanitary Arrangements                                    | 17          |
| 1-38           | Electric Power   | 17          |
| 1-39           | Lights, Barricades And Watchmen                          | 17          |

| <b>SECTION</b> | <b>TITLE</b>  | <b>PAGE</b> |
|----------------|---|-------------|
| 1-40           | Explosives  | 18          |
| 1-41           | Injury To Property                                    | 18          |
| 1-42           | Indemnification Of City                               | 19          |
| 1-43           | Contract Time For Completion                          | 19          |
| 1-44           | Extension Of Time                                     | 19          |
| 1-45           | Normal Work Week And Holidays                         | 20          |
| 1-46           | Responsibility Of The Contractor                      | 20          |
| 1-47           | Shop Drawings   | 21          |
| 1-48           | Payment For Material Not Included<br>In The Work      | 21          |
| 1-49           | Use Of A Portion Of The Work                          | 21          |
| 1-50           | Liens   | 22          |
| 1-51           | Subletting Or Assignment Of Contract                  | 22          |
| 1-52           | Prosecution Of Work                                   | 22          |
| 1-53           | Character Of Workmen And Equipment                    | 23          |
| 1-54           | Strikes   | 23          |
| 1-55           | Abandonment Or Delay Of Work                          | 23          |
| 1-56           | Scope Of Payment                                      | 24          |
| 1-57           | Extra Work  | 24          |
| 1-58           | Extra Work As Part Of Contract                        | 24          |
| 1-59           | Force Account Work                                    | 25          |
| 1-60           | Current Estimates                                     | 26          |
| 1-61           | Conditional Acceptance And Semi-Final<br>Estimate     | 27          |
| 1-62           | Final Inspection, Final Estimate And<br>Final Payment | 28          |
| 1-63           | Evidence Of Payment                                   | 28          |
| 1-64           | Termination Of Owner's Liability                      | 28          |
| 1-65           | Pre-Bid Conference                                    | 28          |
| 1-66           | Telephone Numbers                                     | 29          |
| 1-67           | Existing Utilities And Services                       | 29          |
| 1-68           | Standard Specifications                               | 29          |
| 1-69           | Safety  | 30          |
| 1-70           | Bid Proposal - Quantities, Etc.                       | 30          |
| 1-71           | Maintenance Of Traffic                                | 30          |
| 1-72           | Construction Sequence                                 | 30          |
| 1-73           | Erosion And Sediment Control                          | 31          |
| <b>2</b>       | <b>TRENCH EXCAVATION, BACKFILL AND<br/>PROTECTION</b> | <b>32</b>   |
| 2-01           | General   | 32          |
| 2-02           | Removal And Storage Of Surface<br>Materials           | 32          |
| 2-03           | Caution In Excavation                                 | 33          |
| 2-04           | Width And Depth Of Trenches                           | 33          |
| 2-05           | Length Of Open Trench                                 | 34          |
| 2-06           | Accommodation Of Drainage                             | 34          |
| 2-07           | Unclassified Excavation                               | 35          |
| 2-08           | Blasting  | 35          |
| 2-09           | Bracing Or Sheet piling                               | 36          |

| <b>SECTION</b> | <b>TITLE</b>                                  | <b>PAGE</b> |
|----------------|---|-------------|
| 2-10           | Test Pit Excavation                           | 36          |
| 2-11           | Responsibility For Condition Of<br>Excavation | 36          |
| 2-12           | Selected Backfill                             | 37          |
| 2-13           | Excavation Backfill                           | 38          |
| 2-14           | Fill And Backfill Around Structures           | 40          |
| 2-15           | Cleanup                                       | 40          |
| 2-16           | Maintenance Of Backfilled Excavations         | 40          |
| 2-17           | Ditches On Private Property                   | 41          |
| 2-18           | Sodding                                       | 41          |
| 2-19           | Protection Of Property And Structures         | 42          |
| 2-20           | Trees   | 42          |
| 2-21           | Stripping And Restoring Topsoil               | 42          |
| 2-22           | Maintenance Of Top Surfaces                   | 42          |
| 2-23           | Crusher Run Stone                             | 43          |
| 2-24           | Repaving                                      | 44          |
| 2-25           | Public Convenience And Safety                 | 44          |
| 2-26           | Maintenance Of Traffic                        | 45          |
| 2-27           | Preservation And Restoration of<br>Property   | 46          |
| <b>3</b>       | <b>WATER MAINS AND APPURTENANCES</b>          | <b>47</b>   |
| 3-01           | Materials                                     | 47          |
| 3-02           | Gate Valves                                   | 47          |
| 3-03           | Fire Hydrants                                 | 48          |
| 3-04           | Roadway Valve Boxes                           | 49          |
| 3-05           | Service Pipes For Water                       | 49          |
| 3-06           | Curb Stop                                     | 49          |
| 3-07           | Curb Box                                      | 49          |
| 3-08           | Corporation Stop                              | 49          |
| 3-09           | Branch Connection                             | 50          |
| 3-10           | Construction Methods                          | 50          |
| 3-11           | Connections To Existing Water Mains           | 51          |
| 3-12           | Fire Hydrant Connections                      | 51          |
| 3-13           | Buttresses And Anchorages                     | 52          |
| 3-14           | Defects To Be Made Good                       | 52          |
| 3-15           | Sterilization And Field Tests Of<br>Piping    | 53          |
| 3-16           | Location Marker For House Service             | 55          |
| 3-17           | Water Construction Stakeout                   | 55          |
| <b>4</b>       | <b>SANITARY SEWERS</b>                        | <b>56</b>   |
| 4-01           | General                                       | 56          |
| 4-02           | Materials                                     | 56          |
| 4-03           | Construction Methods                          | 61          |
| 4-04           | Sewer Construction Stakeout                   | 70          |

| <u>SECTION</u> | <u>TITLE</u>                         | <u>PAGE</u> |
|----------------|--------------------------------------|-------------|
| 5              | ROADWAY AND STORM DRAIN CONSTRUCTION | 71          |
| 5-01           | General                              | 71          |
| 5-02           | Construction Methods                 | 71          |
| 5-03           | Storm Drain System                   | 72          |
| 5-04           | Rip Rap                              | 72          |
| 5-05           | Curb And Gutter                      | 72          |
| 5-06           | Roadway Base and Surface Courses     | 73          |
| 5-07           | Concrete                             | 73          |

## DEFINITIONS

**ADDENDA** - Written or graphic instruments issued prior to the execution of the Contract Agreement which modify or interpret the contract documents, by additions, deletions, clarifications or corrections.

**BID** - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.

**BIDDER** - Any person, firm or corporation submitting a bid for the work.

**BONDS** - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the Contractor and his surety in accordance with these Contract Documents.

**CHANGE ORDER** - A written order to the Contract, signed by the Owner, Engineer, and other required agency representatives, authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the contract price or contract time.

**CITY** - The Mayor and Common Council of Westminster and their duly authorized agents.

**CONTINGENT ITEMS** - Those fixed price items listed in the proposal required to complete the contract, over and above the work covered by the bid items.

**CONTRACT DOCUMENTS** - The contract, including advertisement for Bids, Information for Bidders, Bid, Bid Bond, Written Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Orders, drawings, these specifications, standard specifications, and addenda.

**CONTRACT PRICE** - The total monies payable to the Contractor under the terms and conditions of these Contract Documents.

**CONTRACT TIME** - The number of calendar days stated in the Contract Documents for the completion of the work.

**CONTRACTOR** - The person, firm or corporation with whom the Owner has executed the Agreement.

**DRAWINGS, PLANS** - The part of the contract documents which show the characteristics and scope of work to be performed and which have been prepared by the Engineer and approved by the Engineer and Owner.

**ENGINEER** - Name, address, phone number of design engineer, or other agent of the Owner.

**FIELD ORDER** - A written order effecting a change in the work not involving an adjustment in the contract price or an extension of the contract time, issued by the Engineer to the Contractor during construction.

**NOTICE OF AWARD** - The written notice of the acceptance of the bid from the Owner to the successful bidder.

**NOTICE TO PROCEED** - Written communication issued by the Owner to the Contractor authorizing him to proceed with the work and establishing the date of commencement of the work.

**OWNER** - The property owner or developer, a corporation, association, partnership, or individual for whom the work is to be performed. The party of the first part, as set forth in the Contract Documents.

**PROJECT** - The undertaking to be performed as provided in these Contract Documents.

**SHOP DRAWINGS** - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a Subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated or installed.

**SPECIFICATIONS** - A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

**SUBCONTRACTOR** - Any individual, firm or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the work at the site.

**SUBSTANTIAL COMPLETION** - That date as certified by the Engineer when the construction of the project or a specified part thereof is sufficiently completed, in accordance with the contract documents, so that the project or specified part can be utilized for the purposes for which it is intended.

**SUPPLIER** - Any person or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.

**WORK** - Any and all obligations, duties and responsibilities necessary to produce the construction required by these Contract Documents, all labor, materials and equipment incorporated or to be incorporated in the project.

**SURETY** - The corporate body bound with and for the full and complete performance of the contract, and for the payment of all debts pertaining to the work. When applying to the proposal guarantee it refers to the corporate body which engages to insure the execution by the Bidder of a satisfactory contract.

**WRITTEN NOTICE** - A communication addressed to any party involved in the project in writing. It is to be considered delivered and the service thereof completed, when posted by certified or registered mail to the said party or his authorized representative on the work.

- SECTION 1 -

GENERAL CONDITIONS

1-01. GENERAL:

These General Provisions are hereby made a part of the Contract. In case of conflict with other portions of the specifications, the Special Provisions shall govern.

1-02. INTENT OF DRAWINGS AND SPECIFICATIONS:

It is the intent of the drawings, specifications, and supplementary documents to provide the Contractors with such information and instructions as may be necessary to complete the contemplated work. The work under the contract shall be built of the materials, sizes, and dimensions, on the lines and slopes, at the depths, with the connections and in the manner called for by the specifications and as shown on the contract drawings, or in accordance with such changes as may be approved from time to time during the progress of the work as hereinafter provided. In case of any conflict between the specifications and drawings, the Engineer shall determine which shall govern.

1-03. WORK TO BE DONE BY THE CONTRACTOR:

The Contractor shall do all the work and furnish all the labor, materials, tools and appliances necessary and proper for performing the work required by the contract, in the manner called for by the specifications and within the contract time. He shall complete the entire work, together with such extra work as may be required, at the prices bid or fixed thereby to the satisfaction of the Owner, Engineer, and City, and in accordance with the specifications and drawings.

1-04. PLANS AND SPECIFICATIONS SUPPLEMENTARY:

The specifications are intended to supplement and clarify the plans as sometimes work is called for in the specifications that is not shown on the plans and sometimes the plans indicate work that is not mentioned in the specifications. Both plans and specifications must be complied with in order to fulfill the contract requirements; and any work called for by either is as binding as though it were called for by both. In case of conflict between drawings and specifications, the City shall decide which shall prevail. In all cases of doubt as to the true meaning of the specifications, plans and/or drawings, the decision of the City shall be final and conclusive.

**1-05. CONSTRUCTION IN RIGHTS-OF-WAY AND CONSTRUCTION STRIPS:**

A. All permanent construction will be within public rights-of-way or other easements or rights-of-way through private property acquired by the Owner as shown on the drawings and the Contractor shall confine his operations strictly within the limits of the rights-of-way or other easements and construction strips as shown, unless he has the written permission of the owner of the adjacent property to occupy additional ground. A copy of the written permission shall be placed on file with the City. Trees in the construction strips shall not be cut down except with the written permission of the owner of the property. Trees marked to be protected in right-of-way or other easements or construction strip shall be barricaded by 2-inch by 4-inch boards in a box form 10-feet square. Trees permitted to be cut down shall be cut to cord length and stacked. Stumps, roots, branches and other debris shall be removed from the site unless otherwise noted or directed.

B. All work through private property shall be done in such manner as to avoid all cutting of vegetation and other disturbances of the terrain not actually necessary in the installation of the pipes and appurtenances. Lunch papers shall be promptly burned and empty cans, milk bottles, and other empty containers shall not be strewn around or allowed to accumulate on the property. Upon completion of the work, the Contractor shall clean up within the rights-of-way or other easements and construction strips and shall restore the surface, shrubbery, fences and other valuable improvements to at least equal to original condition. The above work is to be included in the contract price bid.

C. Any damage by the Contractor to property outside the limits of the rights-of-way or other easements or construction strips, as the case may be, shall be restored by the Contractor at his own expense.

**1-06. PROTECTION OF PROPERTY AND STRUCTURES:**

The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, tracks, walls, buildings and other structures or property in the vicinity of his work whether above or below the ground or that may appear in the trench. He shall at all times have a sufficient quantity of timber and plank, chains, ropes, etc., on the ground and shall use them as necessary for sheeting his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened or weakened. The Contractor shall take all risks attending the presence or proximity of pipes, poles, tracks, walls, buildings and other structures and property, of every

kind and description, in or over his trenches or in the vicinity of his work, whether above or below the surface of the ground and he shall be responsible for all damages and assume all expense for direct injury, caused by his work, to any of them, or to any person or property by reason of injury to them, whether such structures are or are not shown on the drawings.

**1-07. OBSTRUCTIONS SHOWN ON DRAWINGS:**

Certain information regarding the reputed presence, size, character and location of existing underground structures has been shown on the contract drawings. There is no certainty of the accuracy of this information and it shall be considered by the Contractor in this light. The locations of underground structures shown may be inaccurate and obstructions other than those shown may be encountered. The Contractor shall hereby distinctly understand that the City is not responsible for the correctness or sufficiency of the information given; that he shall have no claim for delay or extra compensation on account of incorrectness of information given, or on account of the insufficiency or absence of information regarding obstructions, either revealed or not revealed by the drawings.

**1-08. REMOVAL OF OBSTRUCTIONS:**

A. Should the position of any pipe, conduit, pole or other structures, above or below the ground, be such as, in the opinion of the Engineer or City, to require its removal, realignment or change, due to work to be done under the contract, the work of removal, realignment or change will be done as extra work unless called for by the plans and specifications or will be done by the owner of the obstructions, without cost to the City. The Contractor shall uncover and support the structures, at his own expense, before such removal, and before and after such realignment or change, as constituting part of the contract; and the Contractor shall not be entitled to any claims for damage or extra compensation on account of the presence of said structure or on account of any delay in the removal or rearrangement of the same.

B. The Contractor shall, without extra compensation, break through and reconstruct, if necessary, the invert or arch of any sewer, culvert or conduit that may be encountered if said structure is in such position, in the judgment of the City as not to require its removal, realignment or complete reconstruction.

C. The Contractor shall not interfere with any persons, firms or corporations, or with the City, in protecting, removing, changing or replacing their pipes, conduits, poles

or other structures; but he shall suffer said persons, firms or corporations, or the City, to take all such measurements as they may deem necessary or advisable for the purpose aforesaid, and the Contractor shall thereby be in no way relieved of any of his responsibilities under the contract.

**1-09. EXISTING PUBLIC UTILITY STRUCTURES:**

A. At least three days prior to starting work in the vicinity of gas mains, telephone and electric conduits and other underground utility structures or their appurtenances, the Contractor shall notify the public utility having jurisdiction of his intention so that the utility may have representatives present. The Contractor shall support and protect the structures as these representatives shall require and shall take any other steps that may be necessary to protect the structures from disturbance or damage. Call "Miss Utility" (800) 257-7777. Call City of Westminster 848-9000 for water main locations (48 hours notice). Call Baltimore Gas and Electric Company 561-2584.

B. Any damage to these structures resulting from the Contractor's operations shall be at his responsibility and any expense to which the Owner or City may be put by reason of any such damage will be charged against the Contractor and deducted from any monies due or to become due him. All of the provisions contained in this section shall be strictly adhered to by the Contractor at no additional compensation over the price bid for the work.

**1-10. STORAGE OF MATERIALS:**

Materials shall be stored so as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms, or other hard, clean surface and not on the ground, and shall be located so as to facilitate prompt inspection. Lawns, grass plots, or other private or public property shall not be used for storage purposes without written permission of the owner or leasee of said property.

**1-11. STRUCTURES TO BE KEPT CLEAN:**

During the progress of the work, until the completion and final acceptance thereof, all structures, including pipe lines and their appurtenances, shall be kept entirely clean throughout. Obstructions or deposits, at any time discovered, shall be removed at once by the Contractor without extra compensation. After the completion of the work the structures, pipe lines and their appurtenances shall be left clean, free and in good order.

**1-12. FINAL CLEANING UP:**

Within 10 days after the completion of the work and before final acceptance, the Contractor shall, without charge therefore, tear down and remove all temporary buildings and other structures built by him, shall remove all rubbish of all kinds from any ground which he has occupied, and shall leave the site of the work in a clean and neat condition.

**1-13. GUARANTEE:**

The Contractor hereby guarantees all of the work performed under this contract for a period of one year after the date of final "acceptance" therefore by the City, as follows:

1. Against all faulty or imperfect materials and against all imperfect, careless, and/or unskilled workman-ship.

2. That all pipe lines and structures shall be water tight and that leakage will not exceed the limits set forth in the specifications.

3. The Contractor agrees to replace with proper workman-ship and materials, and to re-execute, correct, or repair without cost to the Owner or City any work which may be found to be improper or imperfect and to restore and maintain all roads, shoulders, ditches and crossings to their original condition and in accordance with the terms of the appropriate agency permits.

4. No use or acceptance by the Owner or City of the work or any part thereof, nor any failure to use the same, nor any repairs, adjustments, replacements or corrections made by the Owner or City due to the Contractor's failure to comply with any of his obligations under the contract documents, shall impair in any way the guarantee obligations assumed by the Contractor under these documents.

**1-14. GUARANTEE BOND: (MAINTENANCE BOND)**

A. Before final payment is made by the Owner, the Contractor shall be required to furnish the Owner with a Guarantee Bond in the amount of 10% of the Contract. The bond must be executed by a surety satisfactory to the Owner and shall be effective for the one-year guarantee period.

B. It is understood and agreed that in the event the Contractor fails to re-execute, correct or repair, any work performed in the construction of the contract which may be

found to be improper or imperfect, or otherwise fails to fulfill the terms of the Guarantee, the Owner may purchase materials, tools and equipment and employ labor, or let a contract, as required to perform the necessary corrective work covered in the Guarantee. All costs and expenses incurred thereby by the Owner shall be charged against the Guarantee Bond.

**1-15. SUPERVISION AND DIRECTION OF WORK:**

The work shall be under the general supervision of the Engineer and City. While it is intended that the Contractor shall be allowed to carry on the contract in accordance with such general plan as may appear to him most desirable, the City, at its discretion, may from time to time direct the order in which and points at which, the work shall be prosecuted; and shall exercise such general control over the conduct of the work, at any time or place, as shall be required, in its opinion to safeguard the interests of the City. The Contractor shall have no claim for damages or extra compensation on account of the fact that it shall have been necessary to carry on the work in different sequence from that which he may have contemplated. The Contractor shall immediately comply with any and all orders and instructions given by the City, but nothing herein contained shall be considered such an assumption of control over the work by the City as to relieve the Contractor of any of his obligations or liabilities under the contract.

**1-16. DECISIONS AND EXPLANATIONS BY ENGINEER:**

A. The City shall make all necessary explanations as to the meaning and intent of the specifications and drawings and shall give all orders and directions, either contemplated therein or thereby, or in every case in which a difficult or unforeseen condition arises during the prosecution of the work. Should there be any discrepancies in or between, or should any misunderstanding arise as to the import of anything contained in the drawings and specifications, the decision of the City shall be final and binding. Any errors or omissions on the drawings or in the specifications may be corrected by the Engineer when such corrections are necessary for the proper fulfillment of their intent as construed by him.

B. The City shall in all cases determine the amount, quality and acceptability of the work to be paid for under the contract, and shall decide all questions in relation to said work. Its decision and estimate shall be final and conclusive, and in case any question shall arise between the parties regarding the contract, such decision and estimate shall be a condition precedent to the right of the Contractor to receive payment under that part of the contract which is in dispute.

C. Decisions and interpretations will be rendered by the City as promptly as possible, but should delay occur, for any reason, the Contractor shall have thereby no claim for damage or extra compensation.

**1-17. MATERIAL SAMPLES:**

A. Before any contract is awarded, the Bidder shall be required to furnish a complete statement of the origin, composition and manufacturer of any or all materials to be used in the work, together with samples, which samples may be subjected to the tests provided for in these specifications to determine their qualities and fitness for the work.

B. The Contractor shall notify the City where and when he purchases pipe, joining material, etc., for this contract and such notice shall be given to the City in sufficient time to allow for inspection of such materials at the point of manufacture.

**1-18. OWNER MAY INCREASE OR DECREASE QUANTITIES:**

A. The Owner reserves the right to increase or decrease the quantity of material to be furnished or work to be done under the contract wherever he deems it advisable or necessary, and such increase or decrease shall in no way vitiate the contract.

B. The Contractor will be paid for the actual quantity of authorized work done or material furnished under each item of the proposal, at the unit price stipulated for such item. In case the quantity of any item is increased, the Contractor shall not be entitled to compensation over and above the unit price bid for such item; and in case the quantity of any item is decreased the Contractor shall have no claim for damages on account of loss of anticipated profits because of such decrease.

**1-19. INSPECTION:**

The City will appoint such person or persons as it may deem necessary to properly inspect the materials furnished and the work done under the contract, and to see that the same strictly correspond with the drawings and specifications. Work and materials will be inspected promptly, but if, for any reason, delay should occur, the Contractor shall have thereby no claim for damages or extra compensation. Materials and workmanship shall be always subject to the approval of the City; but no inspection, approval or acceptance of any part of the work or of materials used therein, nor any payment on account thereof, shall prevent the rejection of said materials or work at any time thereafter during the existence of the

contract, should said work or materials be found to be defective or not in accordance with the requirements of the specifications and contract.

**1-20. COOPERATION OF CONTRACTOR:**

A. The Contractor will be supplied with five (5) copies of the drawings and of the specifications. The Contractor shall have available on the work at all times at least one copy of the drawings, and a complete book of the specifications; he shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate in every way with the City.

B. The Contractor shall have at all times a competent superintendent or foreman capable of reading and thoroughly understanding the drawings and specifications as his agent on the work to direct the work and to receive instructions from the City. The superintendent or foreman shall have full authority to execute the order or directions of the City without delay and to promptly supply such materials, tools, plant equipment and labor as may be required. Such superintendent or foreman shall be furnished irrespective of the amount of work. The giving of orders or directions in the manner aforesaid shall be equivalent to their receipt by the Contractor.

C. The Contractor shall furnish the City with every reasonable facility for ascertaining whether or not the work performed and materials used are in accordance with the requirements of the specifications and contracts.

**1-21. SERVICE OF NOTICES TO CONTRACTOR:**

The mailing, in a United States post office box, of a written communication, notice or order, addressed to the Contractor at the business address filed with the Owner or to his office at the site of the work shall be considered as sufficient service upon the Contractor of such communication, notice or order, and the date of service shall be the date of such mailing.

**1-22. LINES, GRADES AND ELEVATIONS:**

A. The Contractor shall furnish the field stakeout of all necessary lines, grades, and elevations to complete the work as shown on the plans and specifications. Such stakeouts must be approved by the City, and corrected if and as necessary, before the Contractor proceeds with construction. The Contractor shall have no claims for damages or extra compensation due to delays originating from unapproved stakeouts and/or necessary corrections thereto.

B. The Contractor shall be required to prepare cut sheets on forms. These forms are to be submitted to the City two days prior to the excavation of any trench section. The Contractor shall be responsible for the accuracy of the finished work.

**1-23. WORKMANSHIP:**

All materials furnished and all work done shall be of the quality and character required by the drawings and specifications. Where no standard is specified for such work or materials, they shall be of a kind acceptable to the City. Upon the completion of the contract, the entire work shall be delivered to the City perfect and complete and in a satisfactory working condition.

**1-24. SKILLED LABOR ONLY SHALL BE USED:**

Competent labor only shall be used. Any employee of the Contractor who shall use profane or abusive language to the Inspector or other employees of the City, or is otherwise disorderly and interferes with him in the performance of his duties, or who shall disobey or evade his instructions, or who is careless and incompetent, shall be discharged on the request of the City and shall not again be employed except with the City's consent.

**1-25. ALTERATION OF PLANS AND CHARACTER OF WORK:**

A. The Owner and/or City reserve the right to make such alteration in the plans or in the character of the work as may be considered necessary or desirable from time to time to complete fully and perfectly the construction of the work, provided such alterations do not materially change the original plans and specifications, and such alterations shall not be considered as a waiver of any condition of the contract nor to invalidate any of the provisions thereof. Should such alterations in the plans or in the character of the work be productive of increased cost or result in decreased cost to the Contractor, a fair and equitable sum therefore, to be agreed upon in writing by the Contractor, and the Owner, and approved by the City before such work is begun, shall be added to or deducted from the contract price, as the case may be.

B. No alterations in the plans or in the character of the work shall be made without the previous written approval of the City. Approved change orders are required for alterations or work character modifications costing in excess of \$100.00. This applies to bid or contingent items and/or negotiated work that may not be covered herein.

**1-26. TESTS OF MATERIAL SAMPLES:**

All tests of materials shall be made in accordance with the official approved methods as described or designated at a laboratory or testing bureau approved by the City. The cost of testing samples of materials obtained at the job site shall be paid by the Owner or Contractor who shall cooperate and assist in making field tests and in obtaining samples.

**1-27. CARE AND PROTECTION OF WORK:**

From the commencement of the contract until its completion, the Contractor and Owner shall be solely responsible for the care of the work; and all injury or damage to the same from whatever cause, shall be made good by him at his own expense before the final payment is made. He shall provide suitable means of protection for all materials intended to be used in the work in progress, as well as for complete work.

**1-28. DEFECTIVE WORK:**

Neither the inspection or supervision of the work, nor the presence or absence of any employee or agent of the City during the execution of any part of the work, shall relieve the Contractor of any of his obligations under the contract or of conforming his work to the lines; grades and elevations which are required; and defective work shall be made good and unsuitable material will be rejected, notwithstanding that such work and material may have been previously overlooked and accepted or estimated for payment. If the work or any part thereof shall be found defective within one year of final acceptance or to have been damaged, at any time before the final acceptance of the whole work, the Contractor shall forthwith make good such defect or injury, in a manner satisfactory to the City, without extra compensation therefore, even though said defect or injury may not have been due to any act, default or neglect on the Contractor's part; provided, however, that should such defective work result from inherent flaws in the materials (if any) furnished by the Owner, the materials to replace same will be furnished by the Owner, and the cost of removing and replacing said defect will be paid for as extra work. All materials shall be carefully examined by the Contractor for defects, just before placing, and any found defective shall be rejected.

**1-29. CLAIMS FOR DAMAGE:**

A. If the Contractor shall claim compensation for any damage sustained by reason of the acts of the Owner, or any official or agent thereof, he shall, within five (5) days after the sustaining of such damage, make a written statement to the

Owner of the nature of the damage sustained, and shall on or before the fifth day of the month succeeding that in which he shall allege that such damage has been sustained, file with the Engineer an itemized statement of the details and amount of such damage. Unless such statement shall be made as thus required, his claim for compensation shall be forfeited and invalidated, and he shall not be entitled to payment on account of any such damage.

B. Whenever it shall appear to the Contractor that due to the urgencies of the work, he is about to incur damage, owing to the neglect or refusal of the Engineer to issue an extra order, or to any other cause whatever, he shall at once notify the Owner in writing of such fact and state the nature of his possible claim, in order that the Engineer may obtain necessary and authentic information to guide future consideration and action on such claim; and unless the Contractor shall comply with this requirement, his claim for damage shall be forfeited and invalidated. Such notification shall not take the place of, but shall be in addition to, the written statement hereinbefore required to be submitted within five (5) days after the occurrence of an alleged cause for damage.

C. In no case shall the City be held liable for claims of damage by or between the Owner, Engineer, and/or Contractor.

**1-30. UNAUTHORIZED WORK:**

Work done without lines and grades being given, work done beyond the lines and grades shown on the plans or as given, except as herein provided or any extra work done without written authority, will be considered as unauthorized and at the expense of the Contractor and will not be approved by the City or paid for by the Owner. Work so done may be ordered removed and replaced by the City at the Contractor's expense.

**1-31. LAWS AND REGULATIONS:**

In all operations connected with the work, all ordinances and regulations of incorporated towns within which same is to be done, and all United States, State and County Laws, which shall be or become applicable to, and control or limit in any way the actions of those engaged as principal or agent, must be respected and strictly complied with. The Contractor shall protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance or regulation, whether by himself or his employees. The Contractor shall pay all taxes required by Federal, State and County laws.

**1-32. INSURANCE:**

A. The Contractor shall not commence work under this contract until he has obtained all insurance required under Section 1-33 and such insurance has been approved by the Owner; nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required by the subcontractor has been so obtained and approved.

B. The Contractor shall take out and maintain during the life of this contract adequate Workmen's Compensation Insurance and Employees' Liability Insurance for all his employees employed at the site of the project and, in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance and Employees' Liability Insurance for the latter's employees unless such employees are covered by the protection afforded by the Contractor.

**1-33. LIABILITY INSURANCE:**

A. The Contractor shall maintain such insurance as will protect him from claims under Workmen's Compensation Acts and from any other claims for damage for personal injury, including death, and property damage which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Owner and shall be subject to its approval for adequacy or protection. The certificates shall designate "The Mayor and Common Council of Westminster, its employees and agents" as additional insureds.

B. Limits of Insurance Coverage shall be in an amount not less than the following:

- General Liability           \$ 2,000,000 Annual Aggregate  
                                  1,000,000 Each Occurrence  
                                  1,000,000 Products & Completed  
  Operations  
                                  1,000,000 Personal Injury &  
  Advertising
- Automobile Liability   \$ 1,000,000 Combined Single Limit
- Workers' Compensation                   -- Statutory
- Excess                               \$ 1,000,000 Each Occurrence

C. The contractor shall provide to the City evidence of all insurance required herein.

D. The special hazard of blasting, when anticipated and called for in the Special Provisions, and/or whenever rock or any other obstruction(s) is (are) encountered in the work which makes blasting necessary or desirable, shall be covered by rider or riders to the Public Liability and Property Damage Insurance policy or policies herein required to be furnished by the Contractor or by separate policies in the minimum amount of \$100,000 Property Damage and \$1,000,000 Bodily Injury.

E. The Contractor shall also maintain such insurance and/or riders to policies already issued, when required by the Owner to cover any special hazards which may develop in the course of the work with such companies and in such amounts as may be approved by the Owner.

**1-34. PERMITS, LICENSES, CHARGES, NOTICES:**

The Contractor shall procure and pay for all permits and licenses, pay all royalties, fees and charges and give all notice necessary and incidental to the due and lawful prosecution of the work.

**1-35. PATENT RIGHTS:**

A. Whenever any article, materials, appliance, process, composition, means or things called for by these specifications is covered by Letters Patent, the successful bidder must secure, before using or employing such material, appliance, etc., the assent in writing of the Owner or Licensee of such Letters Patent and file the same with the City.

B. The said assent is to cover not only the use, employment, and incorporation of said article, material, appliance, process, composition, combination, means or thing in the construction and completion of the work, but also the permanent use of said article, material, appliance, etc., thereafter by or in behalf of the City, in the operation and maintenance of the project for the purpose for which it is intended or adapted.

C. The Contractor shall be responsible for any claims made against the City, its agents and employees for any actual or alleged infringement of patents by the use of any such patented articles, appliances, etc., in the construction and completion of the work and shall save harmless and indemnify the City, its agents and employees from all costs, expenses, and damages, including solicitor's and attorney's fees, which

the City may be obliged to pay by reason of any actual or alleged infringement of patents used in the construction and completion of the work herein specified.

**1-36. WATER SUPPLY:**

The Contractor shall provide at his own expense such quantities of clean water as may be required for any and all purposes under the contract. He shall take particular care to furnish his employees with pure and wholesome drinking water. All sources of water supply to be used by the Contractor in connection with the work shall be subject to the approval of the City, and shall be indicated to the City by the Contractor five (5) days before beginning work, so that examination of said supplies can be made.

**1-37. SANITARY ARRANGEMENTS:**

A. Approved sanitary convenience for the use of laborers and others employed on the work, properly secluded from public observation, shall be constructed and maintained by the Contractor, in such manner and at such points as shall be approved or directed and their use shall be strictly enforced. The collections in the same shall be disinfected and/or removed when and as directed.

B. The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the Department of Health or of other bodies or tribunals having jurisdiction thereof. He shall commit no public nuisance.

**1-38. ELECTRIC POWER:**

The cost of electric current used for the construction of this contract, including that current furnished for the Contractor's Field Office, Engineer's Field Office, pumping of water and other purposes shall be borne by the Contractor.

**1-39. LIGHTS, BARRICADES AND WATCHMEN:**

The Contractor shall place sufficient lights on or near the work and keep them burning from twilight to sunrise. He shall erect suitable railings, fences, or other protection about open trenches, and provide all watchmen on the work, by day or night that may be necessary for the public safety. He shall place proper guards and lights for the prevention of accidents during and after delivery of materials and supplies, and shall at all times take all necessary precautions to avoid accidents or injury to persons or property. The Contractor shall upon notice from the Engineer that he has not

satisfactorily complied with the foregoing requirements, immediately take such measures and provide such means and labor to comply therewith as the Engineer or City may direct, but the Contractor shall not be relieved of his obligations under the contract by any such notice or directions given by the Engineer or City, or by his neglect, failure or refusal to give such notice or direction. In case the Contractor shall not comply with any other with respect to guarding his work, or in case of emergency, without notice to the Contractor, if the Owner deems it necessary, the Owner shall provide the required protection and the cost thereof will be deducted from any monies due or to become due the Contractor under the contract. The Contractor shall not be relieved of his obligations under the contract by any such action of the Owner.

**1-40. EXPLOSIVES:**

A. The Contractor shall be licensed in accordance with Regulation C., Title Explosives, pursuant to Chapter 919 of the Acts of 1941, State of Maryland, and shall store all explosives and conduct all operations as regards explosives in accordance with the aforementioned regulation.

B. The Engineer shall be empowered to regulate the character and strength of explosives used. Blasts shall be properly and securely covered.

C. The Contractor shall be solely responsible for injury to persons or property that may result from his use of explosives, and the exercise of, or failure of exercise control on the part of the Engineer, shall in no way relieve the Contractor's responsibility for injury or damage resulting from their use.

D. Under no circumstances shall blasting operations be performed without the use of blasting mats and earth cushion. Such provisions are mandatory and are for the purpose of protecting lives and property.

E. Adequate advance warning of blasting operations shall be given by the Contractor.

**1-41. INJURY TO PROPERTY:**

In case any direct or indirect damage is done to public or private property by or because of the work, or in consequence of any act or omission on the part of the Contractor, his employees or agents, the Contractor shall, at his own expense, restore such property to a condition similar or equal to that existing before such damage was done, by repairing, rebuilding, or otherwise shall make good such

damage in a satisfactory manner; and in case of failure on the part of the Contractor to promptly so restore such property, or make good such damage, the Owner shall, upon forty-eight (48) hours written notice, proceed to repair, rebuild or otherwise restore such property as may be necessary and the cost thereof will be deducted from any monies due or to become due the Contractor under the contract; or the Owner shall deduct from any monies due the Contractor a sum sufficient in the judgment of the Owner to reimburse the owners of the property so damaged.

**1-42. INDEMNIFICATION OF CITY:**

The Contractor shall indemnify and save harmless the City, its employees and agents from all suits, actions and damages or costs, of every name and description, to which the City, its employees and agents may be subjected or by reason of injury to persons or property as a result of the work, whether caused by negligence or carelessness on the part of the Contractor, his servants or agents or to other cause; and so much of the monies due or to become due the Contractor under the contract as shall be considered necessary by the City shall be retained until such suits or claims for damages shall have been settled or otherwise disposed of, and satisfactory evidence to that effect furnished to the City.

**1-43. CONTRACT TIME FOR COMPLETION:**

The Contractor shall schedule his work in such a manner so as to perform the work under this contract within the number of calendar days stated in the Proposal.

**1-44. EXTENSION OF TIME:**

A. If the Contractor is delayed or obstructed in the prosecution of the work by any neglect, delay or default attributable to the Owner, or by any damage that may happen to the work by fire, unavoidable accident or any unusual action of the elements, he shall be entitled to such an extension of time for the completion of the work as the Engineer shall certify to the Owner be just and reasonable; provided however, that the Contractor shall make a claim in writing for such extension of time within ten (10) days after the date the alleged cause for such extension of time occurred.

B. A reasonable and proper extension of time for the completion of the work may also be allowed by the Owner on account of extra work that may be ordered in accordance with the terms of the contract.

C. If the satisfactory execution and completion of the contract shall require work or material in greater amounts or quantities than those set forth in the contract, then the

contract time shall be increased in the same proportion as the additional work bears to the original work contracted for.

**1-45.        NORMAL WORK WEEK AND HOLIDAYS:**

A.    The City observes the following holidays; New Year's Day, Washington's Birthday, Martin Luther King Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the Friday following Thanksgiving and Christmas Day.

B.    The normal work week shall be five (5) days and the Contractor will not be permitted to work on the above mentioned holidays or on Saturdays or Sundays unless otherwise authorized by the City in writing.

C.    The normal number of working hours per day will be limited to a maximum of eight (8), unless otherwise authorized by the City.

D.    In case of an emergency, which may require that work be done on Saturdays, Sundays, holidays or longer than eight (8) hours per day, the Contractor shall request permission of the City to do so. If in the opinion of the City, the emergency is bona fide, it will grant permission to the Contractor to work such hours as may be necessary. Also, if in the opinion of the City, a bona fide emergency exists, it may direct the Contractor to work such hours as may be necessary whether the Contractor requests permission to do so or not. All costs related to overtime wages for inspectors shall be borne by the Contractor provided such overtime is for the convenience of the Contractor.

E.    In the event working times exceed those times specified above, for reasons stated above or at the Contractor's request; and the services of inspection personnel are deemed necessary, as determined by the City; the Contractor shall bear the costs for overtime inspection. Such costs shall be deducted from monies due the Contractor from time to time.

**1-46.        RESPONSIBILITY OF THE CONTRACTOR:**

A.    It is the responsibility of the Contractor to construct the work under this contract so that it will be complete and finished in every detail. If mention has been omitted in the contract documents of any items of work or materials which are necessary for the completion of, or proper functioning of, the construction, it shall be included without extra payment.

B.    If damage is done to any existing work or work placed under this contract, such as cutting masonry, concrete work, paving, damage to existing utilities, etc., such damage must

be repaired and made good without extra payment to the full satisfaction and approval of the City and any agencies having jurisdiction whose work has been affected.

**1-47. SHOP DRAWINGS:**

A. The Contractor shall submit for the approval of the City, five (5) prints of certified working drawings for all fabricated or manufactured articles to be used in the work. No items requiring submission of detail drawings shall be manufactured prior to final approval of the drawings.

B. Two (2) prints of each drawing submitted will be returned approved if found correct, or else showing the changes required. Five (5) copies shall be re-submitted after corrections have been made until final approval is given by the City.

C. The approval of the drawings shall not relieve the Contractor from his responsibility to furnish all materials and perform all work as required by the contract documents. The City will not be responsible for errors or omissions on drawings furnished by the Contractor, even though drawings furnished containing such errors or omissions are inadvertently approved.

**1-48. PAYMENT FOR MATERIAL NOT INCLUDED IN THE WORK:**

Payment for equipment and materials stored on the site of the work and not actually incorporated in the work will be made on the basis of amounts of paid bills submitted to the Engineers along with the monthly estimate as described under "Current Estimates".

**1-49. USE OF A PORTION OF THE WORK:**

A. Whenever in the opinion of the City any portion of the work is completed or is in acceptable condition for use, it may be used for its intended purpose as may be directed; and such use shall not be held to be in any way an acceptance of that portion of the work used or as a waiver of any of the provisions of these contract documents.

B. Necessary repairs or renewals made in any section of the work under instructions from the City due to defective materials or work, natural causes, or ordinary wear and tear, or otherwise, pending final completion and acceptance of the entire work, shall be performed at the expense of the Contractor.

**1-50. LIENS:**

Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner and City a complete release of all liens arising out of this contract, or receipts in full in lieu thereof and, in either case, an affidavit that so far as he has knowledge or information, the releases and receipts include all the labor and material for which a lien could be filed, but the Contractor may if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner and City, to indemnify them against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a lien, including all costs and reasonable attorney's fee.

**1-51. SUBLETTING OR ASSIGNMENT OF CONTRACT:**

A. The Contractor shall keep the work under his own control, and shall not assign, by power of attorney or otherwise, nor sublet the work, or any part thereof, without the written consent of the City. He shall submit, in writing, the name of each subcontractor as he intends employing, the portion of the work which he is to do or the material which he is to furnish, his place of business, and such other information as the City requires in order to know whether said subcontractor is reputable, reliable, and able to properly perform the work he proposes to do.

B. The Contractor shall not, either legally or equitably, assign any of the monies payable under the contract, or his claim thereto, except by consent of the Owner.

C. Written consent by the Owner or City to sublet or assign any portion of the contract shall not be construed to relieve the Contractor or surety of any responsibility for the fulfillment of the contract.

**1-52. PROSECUTION OF WORK:**

A. The Contractor shall begin work promptly on or before notice to proceed on the contract and shall diligently prosecute the same so that it shall be fully completed within the number of working days and the completion date named. Unless work under the contract is started within ten (10) days after the notice to proceed on the contract, the contract shall be void if the Owner notifies the Contractor to that effect.

B. If at any time, progress in keeping with the intent of the contract shall not have been made, the Contractor shall increase the force and supply additional equipment as may be necessary to complete the work at the time and in the manner specified in the contract. Should the prosecution of the work

be suspended by the Contractor, with the consent of the Engineer, the Contractor shall notify the Engineer in writing at least forty-eight (48) hours before resuming operations.

C. Notification must be given to the City forty-eight (48) hours in advance of any beginning or cessation of work.

**1-53. CHARACTER OF WORKMEN AND EQUIPMENT:**

A. The Contractor shall employ only competent, skillful people to do or supervise the work, and whenever the City shall, in writing, notify the Contractor that any person employed on the work is, in its opinion, incompetent, disobedient, unfaithful, disorderly, discourteous, or otherwise unsatisfactory, such person shall be removed and shall not again be employed on the work.

B. The character, condition, adaptability and quantity of equipment used by the Contractor shall be such as will be necessary for the proper execution of the work within the specified working time. Power shovels, power cranes, compressors, tampers, power rollers, pavement breaking, material handling and all other equipment used shall be maintained in good condition and shall be subject to approval of the City prior to and during its use in connection with the work to be performed under the contract.

**1-54. STRIKES:**

The Contractor shall adjust all strikes, or other labor troubles, and no allowance will be made for such delays in the time limit herein named.

**1-55. ABANDONMENT OR DELAY OF WORK:**

If the work under the contract shall be abandoned by the contractor, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the Owner that the performance of the contract is unnecessarily or unreasonably delayed, or that the Contractor is violating any of the provisions of the contract or is executing the same in bad faith, or if the work is not fully completed within the time named for its completion, together with such extension of time as may have been granted, the Owner by written notice, shall order the Contractor to discontinue all work thereunder, or any part thereof; and thereupon, the Contractor shall discontinue the work, or such part thereof; and the Owner shall have the power, by contract, or otherwise, to complete said work and deduct the entire cost thereof from any monies due or to become due the Contractor under the contract. For such completion of the work, the Owner may for itself or its contractors, take possession of and use or cause to be used

any or all materials, tools, machinery and appliances found on the line of said work. When any part of the contract is being carried on by the Owner, as herein provided, the Contractor shall continue the remainder of the work in conformity with the terms of the contract, and in such manner as not to interfere with the workmen employed by the Owner.

**1-56. SCOPE OF PAYMENT:**

The payment of any current, semi-final, or final estimate or the acceptance of any part of the work as provided in the specifications shall in no way or in no degree affect the obligation of the Contractor to repair, correct, renew, or replace, at his own cost and expense, defects or imperfections in the construction of the work under the contract, and this payment shall in no way affect this responsibility for all damages due or attributable to such defects or imperfections which may be discovered before the final acceptance of the whole work, the City to be the judge of such defects or imperfections.

**1-57. EXTRA WORK:**

A. The Contractor shall perform extra work for which there is no provision included in the contract, whenever, to complete fully the work as contemplated, it is deemed necessary or desirable, by written authority of the Engineer, and such extra work shall be done in accordance with the specifications therefore, or in the best workmanlike manner as directed. This extra work will be paid for at a unit price or lump sum to be agreed upon previously in writing by the Contractor and the Owner, or where such a price or sum cannot be agreed upon by both parties, or where this method of payment is impracticable, the Owner shall order the Contractor to do such work on a "Force Account" basis, as hereinafter specified.

B. The Owner/Engineer, before ordering any extra work done, from time to time shall determine (1) what extra time, if any, will be allowed for said extra work; or (2) that the extra work is to be done concurrently with the work under the contract and without allowance of any additional time.

C. Scope of extra work shall be subject to City's approval, and it shall be considered complete only upon City's acceptance.

**1-58. EXTRA WORK AS PART OF CONTRACT:**

No order for extra work, nor the doing of any extra work at any time or place shall in any manner relieve the Contractor or the Surety of his bond from any of their

obligations under the contract documents; all extra work orders being given and all extra work being done, under and in accordance with the contract and to be considered a part of the same and subject to each and every one of the terms and requirements of the contract documents, and fully covered by the bond furnished by the Contractor.

**1-59. FORCE ACCOUNT WORK:**

A. All work done on a "Force Account" basis will be paid for in the following manner:

1. For all labor and foremen in direct charge of the specific operation, the Contractor shall receive the rates of wage applicable to this contract, to be agreed upon in writing before starting such work, for each and every hour that said laborers and foremen are actually engaged in such work, to which shall be added an amount equal to fifteen percent (15%) of the sum.

2. For all materials used, the Contractor shall receive the actual cost of such materials, including freight charges, as shown by original receipted bills, to which sum shall be added an amount equal to ten percent (10%) of the sum thereof.

3. For any machine-power tools or equipment, and for any hauling equipment, including fuel and lubricants, which it may be deemed necessary or desirable to use, the Engineer shall allow Contractor a reasonable rental price, to be agreed upon in writing before such work is begun, for each and every hour that said tools or equipment are in use on such work, and to which sum no percentage shall be added.

B. The compensation as herein provided shall be received by the Contractor as payment in full for work done on a "Force Account" basis, and shall include superintendence, use of tools and equipment for which no rental is allowed, and profit. The Contractor's representatives and the Engineer shall compare records of work done on a "Force Account" basis at the end of each day. Copies of these records shall be made in duplicate, upon the Engineer's "Force Account" forms provided for this purpose, by the Engineer and signed by both the Engineer and the Contractor's representatives, one copy being forwarded respectively to the Engineer and the Contractor. All claims for work done on a "Force Account" basis shall be submitted to the Engineer by the Contractor upon certified triplicate statements, which shall also include the value of all material used in such work; and said statements shall be filed not later than the fifteenth (15th)

day of the month following that in which the work was performed and shall include all labor charges, etc., and material charges insofar as they can be verified.

C. Should the contractor refuse or fail to prosecute the work as directed or to submit his claim as required, then the Owner may withhold payment of all current estimates until the Contractor's refusal or failure is eliminated, or after giving the Contractor due notice, the Owner may make payment for said work on the basis of a reasonable estimate of the value of the work performed.

D. On work as defined in this paragraph, the contractor will be reimbursed for his expenditures for Workmen's Compensation Insurance, Public Liability Insurance, Social Security Taxes and Unemployment Compensation, covering the men actually engaged upon such work. No percentage will be added to such payments, but the Contractor shall be entitled to receive only the actual amount of money expended for such Workmen's Compensation Insurance, Public Liability Insurance, Social Security Taxes and Unemployment Compensation. Such payments shall be based upon the prevailing standard insurance rates supported by receipted vouchers from the insurance vendors and upon the actual amount of taxes paid for Social Security and Unemployment Compensation as evidenced by proper documents furnished by the Contractor.

**1-60. CURRENT ESTIMATES:**

A. The Engineer will, except in the month following that during which the work under the contract is completed, as soon as possible after the 1st day of the month, make in writing an estimate such as he shall believe to be just and fair, of the amount of work done under the contract during the preceding calendar month. Such estimate shall not be required to be made by strict measurement, but may be approximate only and shall be subject to correction in later estimates. Current estimates shall not contain any allowance for materials delivered upon the site of the work, but not incorporated herein, and the Contractor shall not be entitled to receive any payment therefore.

B. Upon the City's approval of each current estimate, the Owner may pay to the Contractor ninety percent (90%) of the total amount of the estimate; provided, however, that the Owner may retain out of any such payment any or all sums which by the terms of the contract, or of any law of the State of Maryland in force at the date of signing of the contract, it is authorized to retain. Payments on current estimates may be at any time withheld if, in the judgment of the City, the Contractor is not complying with the terms of the contract.

C. The City may release from Owner's surety an amount commensurate with the approved payment to the Contractor, subject to retainage as determined by City.

**1-61.        CONDITIONAL ACCEPTANCE AND SEMI-FINAL ESTIMATE:**

A. When the Engineer shall deem that the Contractor shall have fully completed the work under the contract, he shall make a written semi-final estimate of the whole amount of authorized work done by the contractor and of the value thereof under the terms of the contract, and shall certify to the Owner the completion of the work and the amount of the semi-final estimate. All current estimates are subject to correction in the semi-final estimate. The Engineer's measurements upon which the semi-final estimate is based, shall be deemed to be and shall be final and conclusive.

B. Upon approval of the semi-final estimate, the Owner will notify the Contractor, in writing, of the conditional acceptance of the work, and transmit to him a copy of the estimate. Out of the amount representing the total of the semi-final estimate, the Owner shall deduct five percent (5%) which shall be in addition to any and all other amounts which under the contract it is entitled or required to retain, and shall hold said sum for a period of three (3) months from and after the date of payment of the semi-final estimate, as hereinbelow stipulated. Such part as may be necessary, or all of said retained sum shall be applied to any expense to which the Owner may be subjected, during said period of three (3) months, in repairing any defects found in the work under the contract which may be deemed to have been caused by failure of the Contractor to comply with the terms of the contract, or to any breach of the contract whatsoever on the part of the Contractor. The Owner shall be empowered to make any required repairs or renewals during said period, without notice to the Contractor if it shall judge such action to be necessary, or if, after notice to the Contractor if it shall judge such action to be necessary, or if, after notice, the Contractor shall refuse or neglect to do said required work or make satisfactory progress thereon within such period as the Engineer shall consider necessary or reasonable.

C. Within fifteen (15) days after the approval of the semi-final estimate, the Owner will pay to the Contractor the amount remaining after deducting from the total amount of the semi-final estimate all such sums as have therefore been paid to the Contractor under the provisions of the contract and also such amounts as the Owner is authorized under the contract to reserve or retain.

**1-62. FINAL INSPECTION, FINAL ESTIMATE AND FINAL PAYMENT:**

Upon the expiration of the aforesaid period of three (3) months succeeding the payment of the semi-final estimate, paid as above stipulated, the Owner will make a final inspection of the work under the contract. After the Owner is satisfied that all requirements of the contract have been met, after all repairs have been made to any defective work which may have become evident during the above mentioned three (3) month period, and after the Guarantee or Maintenance Bond, has been furnished, the Owner will pay (as the final payment) to the Contractor all sums reserved or retained, less such amounts as it is empowered under the provisions of the contract permanently to retain.

**1-63. EVIDENCE OF PAYMENT:**

The Contractor shall furnish the Owner with satisfactory evidence, before or within ten (10) days after the final completion and acceptance of the whole work under the contract, and the final payment has been made, that all persons, partnerships and corporations who have done work or furnished materials under the contract, or in or about the work contracted for, and who have given written notice to the Owner of claims against the Contractor on account thereof, have been fully paid or secured. In the event such evidence is not furnished by the Contractor, such amount deemed necessary by the Owner to pay such claims shall be retained by the Owner out of any money due the Contractor under the contract until such claims shall have been fully discharged or such notice withdrawn. The Owner may also, with the written consent of the Contractor, use any money retained, due or to become due under the contract, for the purpose of paying for both labor and material for the work, for which claims have not been filed with the Owner.

**1-64. TERMINATION OF OWNER'S LIABILITY:**

The acceptance by the Contractor of the final payment made as aforesaid, shall operate as and be a release to the Owner and every officer and agent thereof, from all claims by the liabilities to the Contractor for anything done or furnished for or relating to or affecting the work under the contract.

**1-65. PRE-BID CONFERENCE:**

May be required at City's discretion.

**1-66. TELEPHONE NUMBERS:**

The Contractor shall furnish the Owner and City the names, addresses and telephone numbers of the responsible personnel who may be contacted at all times in the event the Contractor's services may be required for any eventuality or conditions affecting this work.

**1-67. EXISTING UTILITIES AND SERVICES:**

A. There are shown on the plans the approximate location of existing underground services and utilities. These have been placed on the plans from the best available information that could be obtained. However, no guarantee is given to the accuracy or completeness of the extent and location of these services and utilities. The Contractor shall exercise all possible caution in maintaining such services and utilities in a continuous operating condition.

B. If it becomes necessary to interrupt these services and/or utilities, the Contractor shall provide written notice to the individual properties and to the City at least forty-eight (48) hours in advance of actual interruption. In no case shall an individual service be interrupted for a period exceeding four (4) hours.

C. All costs related to repair or replacement of services and/or utilities shall be included in the respective unit prices bid for installation of services.

**1-68. STANDARD SPECIFICATIONS:**

Whenever standard specifications are referred to, they shall be the latest edition of that specification, and they shall be considered to be a part of these specifications insofar as they apply. Standard specifications referred to herein and the abbreviations by which they are referred to are as follows:

|       |   |
|-------|---|
| AASHO | - American Association of State Highway Officials |
| ASTM  | - American Society for Testing and Materials      |
| AWWA  | - American Water Works Association                |
| MSHA  | - Maryland State Highway Administration           |
| ACI   | - American Concrete Institute                     |
| AWA   | - American Welding Society                        |
| SSPC  | - Steel Structures Painting Council               |
| ANSI  | - American National Standards Institute           |
| ASME  | - American Society of Mechanical Engineers        |
| FS    | - Federal Standard Stock Catalog                  |

CS - Commercial Standards, U. S. Department of  
Commerce, National Bureau of Standards  
MUTCD - Manual on Uniform Traffic Control Devices

**1-69. SAFETY:**

In order to protect the lives and health of his employees under the contract, the Contractor shall comply with all occupational safety laws adopted by the State and local government and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of, and in the course of, employment on work under the contract. He will erect and maintain, as required by the conditions and progress of the work, all necessary safeguards, including the posting of danger signs and other warnings against hazards. All damage, injury or loss referred to in the proceeding paragraphs caused directly or indirectly, in whole or in part, by the Contractor, or any subcontractor or anyone employed by them will be remedied by the Contractor. The contractor alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

**1-70. BID PROPOSAL - QUANTITIES, ETC.:**

In the event of over/under run in quantities and/or conditions, the Contractor shall be paid/reimbursed in accordance with unit prices in Bid Proposal. Quantities and amounts are as accurate as can be determined from available data and information. Contractor shall expect reasonable deviations from proposed quantities, which may be more or less, and total cost of contract shall be so determined.

**1-71. MAINTENANCE OF TRAFFIC:**

Traffic must be maintained on all streets during the construction period. The Contractor shall schedule his construction operations in such a manner as will cause the least inconvenience to the public. Costs incurred shall be at the Contractor's expense. Methods of traffic control used shall be in strict accord with the Traffic Control Plan and the MUTCD.

**1-72. CONSTRUCTION SEQUENCE:**

The Contractor's attention is directed to the fact that essential services and vehicular access must be maintained in the zone of construction. The sequence of construction shall be established prior to start of construction and presented by the Contractor in a proposed schedule. The schedule will be

submitted to the Engineer and City for approval. Once the Contractor's proposed construction sequence has been approved, no deviation from that sequence without the advance approval of the City will be permitted except in emergencies. All construction of main line sewers shall commence at the lowest point and proceed up slope to the highest point. Installation of manholes, manhole frames and covers, and laterals shall proceed concurrently with main line installations. Installation of laterals between any two (2) adjacent manholes shall commence within fifteen (15) calendar days following the installation of the main line sewer connecting those two (2) manholes and shall be completed as soon as practicable thereafter. For the purposes of this paragraph the term "lowest point" is defined as the point of connection to an existing sewer line or structure.

**1-73. EROSION AND SEDIMENT CONTROL:**

A. The Contractor's attention is directed to the provisions and requirements in Chapter 245 of the Acts of 1970 of the State of Maryland. Under this Act it is necessary for the Contractor to obtain permits and/or approvals from the appropriate County agency for any off-site work which includes off-site borrow pits, waste areas and the treatment of these during and after the completion of the grading. The County agency will refer the plan for such areas to the Soil Conservation District for review and approval of the erosion and sediment control provisions. A copy of the permits or approvals must be furnished to the Engineer prior to starting any work covering the said permits or approvals. In the event of conflict between these Federal, State or Local agencies, the more restrictive laws, rules or regulations will apply.

B. The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor for the duration of the Contract. The Engineer reserves the right to inspect erosion control measures in off-site borrow pits and waste areas and to report violations of permit requirements to the County agencies.

C. Any required erosion controls for the pipe work shall be complied with by the Contractor as shown on the drawings or on permits issued.

- SECTION 2 -

**TRENCH EXCAVATION, BACKFILL AND PROTECTION**

**2-01. GENERAL:**

A. The Contractor shall excavate, protect, and refill all trenches and other excavations that may be necessary for constructing the work under this contract, as indicated on the drawings and specified herein. Trench excavations shall, in general, be excavated and backfilled by hand and machinery, as the Contractor may elect; provided however, that the Owner or the City shall be empowered when it deems necessary to direct that hand excavation shall be employed; and provided further that backfilling by hand shall be done to the extent hereinafter specified. The Contractor shall have no claim for extra compensation due to the fact that hand, instead of machine excavation, may be required at any location where necessary from any cause whatsoever.

B. All excavation under this contract will be unclassified. The Contractor shall perform all excavations regardless of the character of the materials to be excavated or condition of the site.

C. The Contractor shall keep all excavations free from water or other liquids during progress of the work. He shall provide and keep in operation such pumps, drains, ditching, etc., as may be necessary to keep excavations dry and free from water or other liquids.

D. No measurement will be made of the work described under this Section. Its cost shall be included in the lump sum bid prices for the pipelines under this Contract.

**2-02. REMOVAL AND STORAGE OF SURFACE MATERIALS:**

A. The Contractor shall remove all surface materials, regardless of the nature, over the line of the trench and the site of the other structures; and he shall properly store, guard and preserve as much of the said material as may be required for use in backfilling, resurfacing, repaving, or for other purposes. All the curb, gutter and flagstones and all paving material which may be removed, together with all materials taken from the trenches, shall be stored in such parts of the roadway or such other suitable place, and in such manner as shall be approved and directed. The Contractor shall be responsible for any loss of or damage to curb, gutter and flagstones and to paving materials through their careless removal or neglectful or wasteful storage, disposal or use.

B. The Contractor shall remove the paving for such width only as is necessary for the excavation of the trench, as shown on the drawings and standard details, and in case he removes the paving for a greater width than is deemed necessary, or in case he removes or disturbs any paving on account of settlement, slides or caves, or in making excavation outside the lines of the work without the written order of the Owner, the Owner may retain any monies due or to become due the Contractor, to cover the cost of permanently replacing the paving so removed.

**2-03. CAUTION IN EXCAVATION:**

The Contractor shall proceed with caution in any excavation and shall use every means to determine the exact location of existing underground structures, pipe lines, conduits, etc., prior to excavating in the immediate vicinity thereof. The Contractor shall be held strictly responsible for the repair and/or replacement of any structure, pipe line, conduit, etc., above or below the ground, which may be broken or otherwise damaged by his operations.

**2-04. WIDTH AND DEPTH OF TRENCHES:**

A. Trenches shall be excavated to the necessary width and depth as may be shown on the details or as directed. The sides of the trenches shall be practically plumb and will not be permitted to be sloped except with the approval of the Owner. Except as modified below, pipe line sub-grade shall be termed the underside of the barrel of the pipe. For masonry structures, sub-grade shall be termed the underside of the masonry or fill material as shown on the drawings.

B. Trench sub-grade shall be such as to provide a uniform and continuous bearing and support for the pipe for the full length of the pipe, except for that portion at the bell hole. For all pipe, other than sanitary sewer pipe, bell holes shall be excavated in the bottoms and side of trenches to permit the proper making of joints.

C. All sanitary sewer pipe shall be cradled in SRC #6/ASTM #57 crushed stone at all locations. The stone cradle shall extend up to 1 foot above the top of the pipe and be firmly compacted to prevent crushing the pipe during backfilling, with 4-inch minimum depth under the pipe.

D. Where the bottom of the trench at sub-grade is in unstable or unsuitable material, excavation shall be carried to such depth as ordered by the City. The trench bottom shall be restored to sub-grade with suitable earth or SRC #6/ASTM #57 crushed stone and thoroughly compacted.

E. Any part of the bottom of the trench which may be excavated in error below the specified grade shall be corrected as specified above at no additional compensation to the Contractor.

**2-05. LENGTH OF OPEN TRENCH:**

A. No greater length of trench in any location shall be left open in advance of the completed structure placed therein, than shall be authorized or directed. The City shall be empowered at any time to require the refilling of open trenches over completed pipe lines, if in its judgement such action is necessary and the Contractor shall thereby have no claim for extra compensation even though to accomplish said refilling, he is compelled temporarily to stop excavation or other work.

B. The Contractor shall not have more than approximately one hundred fifty (150) feet of open trench at any one time.

C. If work is stopped on any trench, for any reason by order of the Owner or the City, and the excavation is left open, the Contractor shall, as directed, refill such trench at his own cost, and shall not again open said trench until he is ready to complete the structure therein. If the Contractor should refuse or fail to refill such trench completely within forty-eight (48) hours after said notice, the Owner will have the work performed and charge the expense thereof to the Contractor and retain the same out of any monies due or to become due him under the contract.

D. The excavation of all trenches shall be fully completed at least twenty (20) feet in advance of pipe laying, unless otherwise authorized.

**2-06. ACCOMMODATION OF DRAINAGE:**

A. Gutters and drains shall be kept open at all times for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted, except to a limited extent where the Engineer shall consider the same necessary or allowable.

B. The Contractor shall keep all trench excavations free from water or other liquids, at his own expense, while work is in progress, and to such extent as may be necessary while excavation work is being carried on. All water and/or liquid removed from trenches shall be disposed of in such a manner so as not to cause injury to the public health, to public or private property, or to any portion of the work completed or in progress, or any impediment to the use of the streets by the public.

**2-07. UNCLASSIFIED EXCAVATION:**

All trench excavation under this Contract shall be unclassified excavation and shall consist of and include all necessary excavations, grading, removal of rock, paving, structures and obstructions, the removal and satisfactory disposal of all material (including clearing and grubbing) and covers all types of excavation.

**2-08. BLASTING:**

**A. Vibration Control**

1. The Contractor shall at all times be responsible for damage caused by vibrations due to blasting or any of his other operations. When blasting has to be undertaken adjacent to a structure, the Contractor shall ensure that the "Peak Particle Velocity" at the structure shall not exceed 2 in./sec. The "Peak Particle Velocity" is defined as the maximum of the three velocity components measured at a point, and shall be measured with a three component vibration recording instrument capable of producing a permanent record.

2. If a Scaled Distance of 50 or greater is used with minimum delays of 8 milliseconds, the following formula can be used to determine the maximum charge weight per delay that can be used without seismic instrumentation.

$$\text{Charge Weight (Pounds per delay)} = \frac{\text{Actual Distance (Ft.)}^2}{(\text{Scaled Distance})}$$

3. No blasting shall be undertaken without a valid permit at the blasting site and the written authorization of the City.

**B. Protection of Underground Utilities**

1. All blasting performed in the vicinity of underground utility lines shall be conducted as follows:

a. Excavation to the elevation of the top of the buried utility may proceed at the discretion of the Blaster using accepted techniques.

b. At and below the elevation of the top of the buried utility line the vertical depth of blast holes is restricted to 1/2 the horizontal distance to the closest portion of the utility. The blast hole is restricted to a maximum of 3 inches with no more than 1 hole per delay.

**2-09. BRACING OR SHEETING:**

A. The Contractor shall support the side and ends of all excavations wherever necessary or directed with braces, sheeting, shores, or stringers of the quality and character herein specified. Trench excavation and shoring shall comply with Title 29, Code of Federal Regulations, Part 1926, Sub-part P, "Occupational Safety and Health Regulations for Construction." All timbering shall be put so arranged that it may be withdrawn as refilling proceeds, without injury to the structures built under the Contract or to any road bed or adjacent structure or property. If in the opinion of the City, the material furnished for timbering excavations is not of proper quality or sufficient size or not properly placed to insure the safety of the work or of adjacent structures or property, the Contractor shall upon notice forthwith, procure and place satisfactory timbering, or place said timbering in a satisfactory manner; and upon his failure to do so, the work may be ordered stopped until said notice shall have been complied with and without entitling the Contractor to any claim for extra compensation, damage or delay.

**2-10. TEST PIT EXCAVATION:**

A. The Contractor shall do such miscellaneous excavation work as may be necessary or directed. This may include the digging of test pits, extra width of trench made necessary by change in its location, or excavation for any special structure, outside the trench, that may not be shown in the drawings or described in the Specifications, where such excavation is done at the direction of the Owner or the City. Such excavation shall be subject to the same conditions and requirements as specified for trench excavations.

B. Test pits shall be dug by the Contractor wherever directed. Their depth and size shall be such as shall be required by the Owner or the City. Test pits may be dug by the contractor without being directed to do so, along the lines of excavation as shown on the drawings, in advance of the excavation, for the purpose of satisfying himself as to the location of underground obstructions.

C. All miscellaneous excavation and test pits dug by order of the Owner or the City shall be done so without compensation therefor.

**2-11. RESPONSIBILITY FOR CONDITION OF EXCAVATION:**

A. The Contractor shall be responsible for the condition of all excavations made by him. All slides and caves shall be removed without extra compensation, at whatever time and under whatever circumstances they may occur.

B. The neglect, failure or refusal of the Owner or the City to order the use of bracing or sheeting, or a better quality or larger sizes of timber, or to order sheeting, bracing, or shoring to be left in place, or the giving or failure to give orders or directions as to the matter of methods of placing or driving sheeting, bracing, or shores, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the conditions of the excavation or of any of his obligations under the contract; nor shall any delay, whether caused by any action or want of action on the part of the Contractor or by any act of the City or Owner or his agents or employees, resulting in the keeping of an excavation open longer than would otherwise have been necessary, relieve the Contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from any of his obligations under the contract relating to injury of persons or property not entitle him to claim for extra compensation.

**2-12. SELECTED BACKFILL:**

A. Selected backfill shall be made normally with the earth removed from the trench or excavation, provided that, in the opinion of the Owner or the City, the excavated material is suitable for backfilling. Suitable material for selected backfill shall be construed as material of a classification that will pass a one-inch sieve 100 percent and compact readily when the usual methods of tamping are used. Unsuitable material shall be construed as clay, material that will not crumple under light hand pressure, frozen materials, ashes, cinders and putrescible or other refuse. No material other than selected backfill shall be used for backfilling until the pipe or other structure has two (2) feet or more cover. Above that, except the last two (2) feet, small stones not larger than ten (10) inches in their greatest dimension, will be permitted in an amount not in excess of twenty (20) percent of the volume of backfill material, and such stones shall be well distributed throughout the mass.

B. Should the Owner or the City consider the excavated material unsuitable for backfilling, then the Contractor shall remove and dispose of such unsuitable material and procure and substitute selected backfill material excavated elsewhere.

C. All backfill materials, including selected backfill used, shall contain a sufficient amount of moisture for proper compaction. These materials shall be compacted to not less than the specified density indicated in Paragraph 2-13, Excavation Backfill. Upon placement of the backfill in the trenches in layers included in any areas under the Contract, the Owner or the City may make tests to determine the degree of compaction of the backfill material. If the results of any

test show that the backfills are not compacted sufficiently as specified, the Contractor shall at his own expense, remedy the condition, as directed, in such portions of the trenches as are represented by the unsatisfactory tests.

D. After completion of backfilling, all material not used therein shall be removed and disposed of in such a manner and at such point or points as shall be approved or directed. All roads, sidewalks and other places on the line of the work shall be kept clean and free of excess material.

## **2-13. EXCAVATION BACKFILL:**

A. The Contractor shall backfill all trench and structure excavations immediately upon completion of laying the pipelines, building the structure, or immediately after the excavations have served their purpose. Any unauthorized excavations made by the Contractor shall be immediately backfilled at the Contractor's expense. No backfilling operations shall commence until direction is furnished by the City.

B. In general, the backfilling materials shall be the materials as previously excavated and as approved by the City. No ashes, putrescible matter, refuse, large stones or rock and/or unsuitable materials for backfilling trenches or structure excavations shall be employed for this operation. The Contractor is expressly prohibited from using the excavations as a dumping ground or disposal area.

C. The jetting or puddling of backfill for trench or structure backfill is expressly prohibited. In the event backfill materials do not possess the optimum moisture content, and are excessively dry as determined by the Owner or the City, clean water shall be added at an approved rate and quantity and thoroughly blended with the soil to achieve the proper moisture content for compaction.

D. Backfilling operations over pipelines, connections, branches, specials of any character, or any part of the structure or work which requires field location for record purposes shall not commence until the location record has been made by the City. Any such backfilling operation made without authorization shall be carefully removed by the Contractor at his own expense.

E. If damage to the constructed pipeline or structure occurs during either authorized or unauthorized backfilling operations, all required corrections and/or replacements shall be at the Contractor's total expense. No backfilling operations shall commence until the joint has been made and approved or in the case of structures all waterproofing or

dampproofing have been inspected and approved.

F. All excavations shall be refilled to the original ground surface or specified elevations or grade as the plans and details may direct.

G. In backfilling all trenches and irrespective of the pipe material, the approved backfill material shall be carefully placed under and around the pipe in six inch (6-inch) plus or minus two (2) inches measured loose layered lifts to a line two (2) feet above the top of the pipe and carefully placed by hand methods. After placement of each layer, compaction and ramming shall be accomplished with mechanical vibrators and rollers, rammers, tampers or other approved special tools manufactured for this express purpose. This backfill shall be compacted to not less than 95 percent of maximum density at optimum moisture as determined by the AASHTO Methods, Compaction and Density of Soils, T-180. All backfills shall be compacted at a moisture within 2 percent of the optimum. In the event the specified density and moisture content is not achieved, the Contractor shall be required to carefully remove the backfilled material and repeat the operations until the specified compaction, density and moisture content are approved.

The Contractor shall provide a Certified Soils Compaction Technician on site at all times during filling and backfilling operations to continuously monitor soil compaction. Test results shall be supplied to the City Construction Inspector upon request.

H. Any and all costs related to removal of unacceptable and unapproved backfill and repeating compaction operations shall be the full responsibility of the Contractor and no extra payment will be made by the Owner if replacement and recompaction is ordered.

I. The backfill from 1 foot above the top of the pipe to the indicated upper limit shall be placed by hand or machinery methods in the measured loose lifts, spread evenly for the full length and compacted as specified below:

1. In City roads, shoulders and for the full length or width of the excavated public right-of-way or trench and/or when the excavation is closer than a 1:1 slope from the edge of any travelled roadway or any structure, regardless of location, the remaining backfill shall also be full trench compaction. This backfill shall be placed in 6 inch, plus or minus 2 inches, measured loose lifts with each lift compacted as specified in Paragraph G above.

2. In existing or acquired utility rights-of-way and/or easements where pavement is not to be placed, the remaining backfill shall be placed in 10 inch, plus or minus 2 inches, measured loose lifts, with each lift compacted to not less than 92 percent of standard density as specified in Paragraph G above.

**2-14. FILL AND BACKFILL AROUND STRUCTURES:**

Special consideration shall be given to fill and backfill around structures above the foundation inside a 2 foot strip adjacent to the structures. Fill and backfill around structures shall be placed in compacted layers not exceeding 6 inches in thickness and each layer shall be compacted by mechanical tampers or light vibratory compactors to the applicable required densities specified hereinbefore. Compaction by rollers or heavy equipment is prohibited within this 2 foot strip adjacent to the structures.

**2-15. CLEANUP:**

After completion of the backfilling, all material not used therein, including such earth as the Owner or the City shall decide cannot be properly rounded up over the refilled trench, shall be removed and disposed of in such a manner and at a location as shall be approved or directed, and all roads, sidewalks, etc., on the line side of the work shall be left free, clean and in good order. Said cleaning up shall be done by the Contractor without extra compensation, and if he shall fail to do such work within reasonable time after receipt of notice, the Owner shall arrange to have the work performed and the cost, thereof, shall be retained out of the monies due or to become due the Contractor under the contract.

**2-16. MAINTENANCE OF BACKFILLED EXCAVATIONS:**

A. The Contractor shall maintain at his own expense all refilled excavations regardless of location for a period of 1 year following the date of final acceptance by the City. All depressions appearing in the backfilled excavations shall be properly backfilled. If the Contractor shall fail to do so within 24 hours after the receipt of written notice from the Owner, or in case of emergency, the Owner shall have the work performed and the cost thereof shall be assessed against the Contractor's Performance Bond covering the 1 year guarantee of all work in connection with this project.

B. The Contractor shall be responsible for any injury or damage that may result from improper maintenance of any backfilled excavations, at any time from the beginning of the work on the contract to the termination of the 1 year guarantee of all work under the Contractor's Performance Bond.

**2-17. DITCHES ON PRIVATE PROPERTY:**

Where ditches are on private property, all fences, walks, walls or other existing features which are damaged shall be restored to their original condition. Sod will be required to restore grass to the condition that the site was in before the ditch was dug. Shrubs, trees or bushes which the property owner wishes to save shall be moved by an approved Nursery and replaced as part of this Contract. Ditches on private property shall be backfilled and mounded with top soil to allow for settlement as directed by the City.

**2-18. SODDING:**

A. The Contractor shall sod all areas shown on the drawings, as specified hereinafter. Sod shall be supplied in strips not less than 1 foot wide. Sod shall be cut at a uniform soil thickness of 3/4 inch, plus or minus 1/4 inch. Sod shall be of sufficient thickness to prevent excessive breakage, and shall be stripped in the largest practicable widths and lengths. Sod shall conform with USDA Spec., Page 54.01 of the Standards for critical area stabilization.

B. After construction operations are complete and the trench consolidated to the satisfaction of the City, approved top soil shall be placed over the disturbed area, trimmed and raked to lines of the previous grade, or the finished grade, with a minimum depth of three (3) inches. All roots, boulders or other debris shall be removed and a finely pulverized bed shall be formed. Commercial fertilizers known as 5-10-5 (the above figures refer to the available percentages of nitrogen, phosphoric acid and potash), delivered in bags or other containers with name of material, weight and analysis on each bag or container, shall be spread at a rate of 30 pounds per 1,000 square feet and raked or harrowed into the top two inches of the top soil.

C. Sod shall then be placed and rolled or tamped, properly leveled and immediately well sprinkled. All sod not in good condition after being placed shall be removed and replaced with suitable sod.

D. On banks or slopes over 2:1 slope, sod shall be staked or pegged in place.

E. The Contractor shall maintain all areas until acceptance of the Contract and any regrading, refertilizing, or resodding, which may be required due to erosion, gullies, washouts, or other causes, shall be done at his own expense. Any areas which fail to show a "catch" or uniform stand for any reason whatsoever, shall be resodded at the Contractor's expense.

F. Any damage done to the area outside the width specified shall be repaired at the Contractor's expense without any claim for additional compensation.

**2-19. PROTECTION OF PROPERTY AND STRUCTURES:**

The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, tracks, walls, buildings, and other structures or property in the vicinity of his work, whether above or below the ground, or that may appear in the trench. He shall at all times have a sufficient quantity of timber and plank, chains, ropes, etc., on the ground and shall use them as necessary for sheeting his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened or weakened. The Contractor shall take all risks during construction in close proximity of pipes, poles, tracks, walls, buildings, and other structures and property, of every kind and description, in or over his trenches or in the vicinity of his work, whether above or below the surface of the ground; and he shall be responsible for all damage and assume all expense for direct or indirect injury, caused by his work to any of them, or to any person or property by reason of injury to them, whether such structures are or are not shown on the drawings.

**2-20. TREES:**

The Contractor shall have no claim for extra compensation due to the fact that he may be required to excavate by hand or tunnel in the vicinity of trees that are to be left standing. No cutting of large roots or tap roots will be permitted.

**2-21. STRIPPING AND RESTORING TOPSOIL:**

For the purpose of the contract, topsoil shall be defined as the top 6 inches of existing earth. Where topsoil exists and in areas where the pipe is to be laid, it shall be stripped, stored and restored to such area after excavation and backfilling of pipe trenches are completed. All finished grades of the disturbed area shall match the finished or undisturbed grades of the adjoining areas.

**2-22. MAINTENANCE OF TOP SURFACES:**

A. The Contractor is specially reminded of the detailed requirements of Paragraph 1-17 above with respect to maintenance of backfilled excavation. In addition to the provisions of these referenced specifications, the Contractor shall perform such additional work as part of the lump sum bid for the work in order to adequately maintain the excavations

for the stipulated contract time limits.

B. After the pipe lines have been constructed and backfilled, material has been thoroughly consolidated, the Contractor shall replace road surface to such extent as the City shall direct. The replacement of all roadway material shall be in accordance with the standards and methods prescribed in the permit issued by the City and made a part of this Contract.

C. Each morning during the life of the contract the Contractor shall ascertain from the Weather Bureau whether precipitation in the form of rain or snow is imminent in the next 24 hours. If such precipitation is imminent the following procedures shall be strictly adhered to:

1. An inspection of the previously filled trench surfaces shall be made daily at the beginning and close of each working day.

2. Should there be any settlement or erosion of the trench topping, the Contractor shall immediately furnish and install such additional mechanically compacted material as may be required to restore the surface to its required and specified line, grade and cross section.

3. Such inspections and additionally installed materials shall be repeated daily as necessary and as directed until acceptance of the work in writing by the City has been made.

D. The same provisions as enumerated above shall govern and be employed in the event of there being trench and/or topping settlement for any cause that modifies the previous restoration of line, grade and cross section of the trench surface.

E. The same provisions shall also apply in utility easements when the trench top surfacing is topsoiled and sodded. Additional topsoil and vegetative cover shall be furnished as required.

## **2-23. CRUSHER RUN STONE:**

A. The Contractor shall furnish and place graded aggregate for subbase, (State Highway Administration aggregate gradation), to the thickness specified below or as directed by the City. In general, crusher run stone shall be placed over trenches in existing road shoulders and over trenches in existing State and City/County roads. No stone shall be placed in lawn areas or areas to be top soiled and seeded.

## **2-24. REPAVING:**

A. Existing paving, disturbed by the Contractor's operations, shall be replaced in accordance with these Specifications.

B. Materials to be utilized in connection with trench repaving for City streets shall conform to those noted under the appropriate paving type in the Maryland State Highway Administration Specifications.

1. As soon as the utility installation and refill have been completed in or adjacent to public or private roads, the Contractor shall place crusher run stone to a depth of 18 inches for improved roadways and 4 inches in all other locations such as dirt roads, earth shoulders, and sidewalks. Normally, this crusher run surface shall be allowed to settle for a period of approximately 30 days before any permanent repaving is undertaken. The City may direct that repaving be accomplished prior to or later than the 30 days noted above. this election will not, however, relieve any guarantee requirements connected with this work.

2. Prior to the installation of permanent repaving, any temporary paving shall be removed. If settlement results in depth in excess of permanent paving thickness, it will be the Contractor's responsibility to add crusher run stone at his own expense to bring the ditch to the proper cross section for the installation of paving. After this has been done, permanent paving shall be installed. Generally, bituminous concrete repaving shall be utilized in bituminous concrete streets, and penetration type patches shall be installed in penetration macadam streets and concrete shall be used in concrete streets. For bituminous concrete streets the permanent paving patch shall be accomplished by the removal of the top 9 inches of crusher run subbase, and replacement with two 3 1/2 inch courses of BI base, and one 2 inch course SN surface. Existing surfaces to be cut back to a neat line as directed by the inspector ( minimum 1 foot each side ), existing base overlapped by new surface. When penetration type patches are used, the last shot of asphalt and aggregate shall overlap the undisturbed paving by at least 12 inches.

## **2-25. PUBLIC CONVENIENCE AND SAFETY**

A. The Contractor at all times shall conduct the work in such a manner as to ensure the least practicable obstruction to all forms of traffic. The convenience of the general public, tenants, and of the residents along and/or adjacent to the improvement shall be provided for. Material stored upon the project shall be placed so as to cause a minimum of obstruction to the public. Sprinkling shall be performed at the direction of the Engineer or City. Existing Department

facilities planned to be removed, but which might be of service to the public during construction are not to be disturbed until other and adequate provisions are made. Existing mailboxes shall be maintained or reset in positions accessible to the public and to mail deliveries during construction and subsequent to construction in their final locations in a satisfactory condition. All footways, gutters, sewer inlets and portions of the project adjoining the work under construction shall not be obstructed more than is absolutely necessary. Work closed down for the winter or at any other times shall be left entirely accessible at all points to fire apparatus.

## **2-26. MAINTENANCE OF TRAFFIC**

### **A. Maintenance of Traffic**

1. It shall be the Contractor's responsibility to maintain pedestrian and vehicular traffic safely, adequately and continuously on all portions of existing facilities affected by his work. In addition to existing facilities undergoing improvement, this also applies to crossroads, approaches, crossovers and entrances affected or made necessary by his work. Traffic control is to be in accord with the approved Traffic Control Plan and the MUTCD.

### **B. Barricades and Warning Signs**

1. The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient lights, danger signals, signs and other traffic control devices, and shall take all necessary precautions for the protection of the work and safety of the public.

2. The Contractor shall erect warning signs in advance of any place on the project where operations may interfere with the use of the facility by vehicular traffic, and at all other points where the new work crosses or coincides with an existing roadway or traffic lane(s). Such warning signs shall be constructed and erected in accordance with the Manual on Uniform Traffic Control Devices, or as directed.

3. The Contractor shall furnish, erect and maintain warning and direction signs in the number required by the Engineer or City and at locations designated by the Engineer or City throughout the limits of the project. For street and highway type traffic the signs shall conform in every respect to the requirements of the Manual on Uniform Traffic Control Devices for Street and Highways. Signs must be freshly painted before being placed on any project. No work may be performed or begun unless an adequate number of signs of the proper category are in place.

C. Flagging of Motor Vehicle Traffic

1. All flagging of motor vehicles shall be conducted as specified in the Manual on Uniform Traffic Control Devices for Street and Highways.

**2-27. PRESERVATION AND RESTORATION OF PROPERTY**

A. The Contractor shall not enter upon public or private property (outside of the right-of-way or project area) for any purpose without obtaining permission and he shall be responsible for the preservation of all public and private property, trees, monuments, signs and markers and fences thereon, and shall use every precaution necessary to prevent damage or injury thereto.

B. The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the work, resulting from any act, omission, neglect or misconduct in his manner or method of executing said work, or at any time due to defective work or materials, and said responsibility shall not be released until the work shall have been completed and accepted. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work or in consequence of the non-execution thereof on the part of the Contractor, he shall restore, at his own expense, such property to a condition similar to, or equal to, that existing before such damage or injury, in an acceptable manner. In case of the failure on the part of the Contractor to restore such property or make good such damage or injury, the Owner may, upon 48 hours notice, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary and the cost thereof will be deducted from any monies due or which may become due the Contractor under his contract.

C. The Contractor shall place cold patch material and/or steel plates over trenches installed in existing streets at the end of each day to the satisfaction of the City's Construction Inspector.

- SECTION 3 -

WATER MAINS AND APPURTENANCES

3-01. MATERIALS:

Quality of materials shall conform to the following:

A. Ductile Iron Pipe to be in accordance with ANSI A21.51-81 and AWWA C151-81, Class 52.

B. Ductile Iron Fittings shall conform to ANSI A21.10-82 and AWWA C153-82. 4" thru 16" shall be Class 350, larger than 16" shall be AWWA C110-82 Class 250 unless otherwise specified.

1. Tapping Sleeves - For water service shall be JCM 432 all stainless steel tapping sleeves or approved equal unless otherwise specified.

C. Joints for pipe shall be Tyton joint or approved push on joint. Joints for fittings to be mechanical unless otherwise specified. Both of these joints shall be in accordance with ANSI A21.11-80 and AWWA C111-800.

D. Cement Lining for both pipe and fittings shall be in accordance with ANSI A21.4-80 and AWWA C104-80 Double Thickness.

E. Marking Pipe and Fittings:

1. Each pipe and fitting shall have the weight and class designation conspicuously painted on it as near as possible to the bell end of the pipe and these designations shall be clearly legible.

2. In addition, each pipe purchased on special order or contract shall have distinctly cast, the month and date of manufacture, with suitable size raised numerals on the face of the bell. This may be indicated as follows: 9/25/85. Also, the initials of the manufacturer shall be cast on the face of the bell in suitable size raised letters.

3-02. GATE VALVES:

A. All valves shall be resilient seat wedge type, epoxy coated, ductile or cast iron body design, non-rising stem, nut operated with mechanical joint ends per AWWA C-111. The valve body and bonnet shall be coated on all exterior and interior surfaces with a fusion bonded epoxy conforming to AWWA C-550.

Valve body, bonnet and gate shall be ductile iron conforming to ASTM A-536 or cast iron conforming to ASTM A126 class B with shell thicknesses conforming to Table 2 Sec. 4.4 AWWA C-509. So-called "thinwall" valves are not allowed. The valve gate shall be covered with rubber over all interior and exterior ferrous surfaces. The rubber shall be securely bonded to the gate body and stem nut. Valves 4" thru 12" shall be rated for zero leakage at 200 psi water working pressure and have a 400 psi hydrostatic test for structural soundness. Valves 14" and larger shall be rated for 150 psi working pressure and 300 psi test. Position, by-pass and gearing requirements of valves 16" and larger to be specified according to individual job requirements. Test certificates shall be furnished upon request.

Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS-SP60. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter. The interior of the waterway in the body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve.

In order to assure compliance with AWWA and other applicable standards, and access to manufacturing facilities for inspection purposes, and assure timely shipment and delivery, all valves must be manufactured, assembled and tested in plants located within the continental United States. Acceptable manufacturers are U.S. Pipe, Kennedy, M & H, Clow and Mueller.

All valves installed adjacent to a tee or cross fitting shall be located within 2'-0" of the fitting and shall be rodded back to the fitting with a minimum of 4 bituminous coated steel threaded rods.

B. Air relief valves shall be Golden Anderson GH-4 Series, or approved equal.

### 3-03. FIRE HYDRANTS:

Fire hydrants shall be manufactured in accordance with AWWA C502-80. Hydrants shall have a minimum 5-1/4" valve opening with 6" mechanical joint inlet and shall be traffic type with two 2-1/2" hose nozzles and one 4-1/2" steamer nozzle; all nozzles to be National standard thread, hydrant shall open left, operating nut to be #7 Pentagon 1-1/2" point to flat. Hydrants to be Mueller Centurion Model A-423, U.S. Pipe Metropolitan, M & H Style 929 Reliant, [and] Clow Medallion Model F-2545 and Kennedy Valve Guardian Model K81-D. All fire hydrants shall be painted as follows:

1. One prime coat of Pennsbury 1-16 series "Flash Dry" gray primer or approved equal.
2. Two coats of Phenolic Urethane Enamel-Safety Yellow or approved equal.

**3-04. ROADWAY VALVE BOXES:**

Roadway valve boxes for 1-1/2" thru 10" shall be a two piece screw type adjustable from 36" thru 48". Bingham & Taylor, Figure #4905, size #21, with 5-1/2" diameter. For 12" and above an oval base will be used. The top cap of the box shall be heavy cast iron marked "water" or approved equal.

All valves located 6'-0" and deeper below finished grade shall require extension stems in the valve boxes up to 12" below finished grade.

Roadway valve boxes are also required on all curb stops installed in concrete driveway aprons and paved surfaces.

**3-05. SERVICE PIPES FOR WATER:**

Copper Pipe for water services shall be seamless copper service pipe suitable for use as underground service connections and general plumbing in accordance with ASTM B88-83a, Class K specifications, U.S. Government Type K specifications WW-T-799.

3 Part unions used for pipe connections shall be Mueller H-15400 flared or H-15403 compression, Ford C22-33, C22-44, C22-55, C22-66, C22-77 or approved equal.

**3-06. CURB STOP:**

Curb stop shall be Mueller with inverted key, Mueller H-15204 or H-15202-2 flared or H-1504-2 compression, Ford B22-333, B22-440, B22-555, B22-660, B22-777 or approved equal.

**3-07. CURB BOX:**

Curb box shall be 2-1/2" diameter Buffalo Type (size 93-E) or approved equal. All curb boxes shall be supplied with foot piece installed under curb stop (Mueller H-10391 for 3/4" and H-10392 for 1") or approved equal.

**3-08. CORPORATION STOP:**

Corporation Stop with coupling nut at main shall be Mueller H-15000 flared or H-15008 compression, Ford F600-3, F600-4, FB600-5, FB600-6, FB600-7 or approved equal.

**3-09. BRANCH CONNECTION:**

Branch connection shall be Mueller H-15340 flared or H-15343 compression, Ford Y22-243, Y22-247 or approved equal. All service ends not connected to house service shall be provided with an iron or brass plug to prevent any foreign matter from entering the pipe.

**3-10. CONSTRUCTION METHODS:**

A. Trench excavation and refill shall be performed in accordance with Section 1 herein.

B. Each length of pipe shall be carefully inspected visually and by "sounding" for possible defects before laying.

C. The pipes and fittings shall be thoroughly cleaned before they are laid with mops or brushes made for the purpose and shall be kept clean until the acceptance of the completed work.

D. The open end of all pipes and fittings shall be provided with carefully fitted stoppers which shall be used at all times to prevent the entrance of dirt or other substances.

E. Pipe shall be carefully handled and lowered into the trench. Proper and suitable tools and appliances for the safe handling of pipes and special castings shall be used.

F. Special care shall be taken to insure that the pipes and fittings are well bedded on a solid foundation. Bell holes shall be dug sufficiently large to insure making of proper joints. Any defects due to settlement shall be made good by the Contractor at his own expense.

G. The ends of pipe shall abut against each other in such a manner that there shall be no shoulder or unevenness on the inside of the main.

H. Whenever a length of pipe requires cutting, or fit in the line or to bring fittings into proper position, the work shall be done in a satisfactory manner so as to leave a smooth end and without extra compensation. Short pieces of pipe cut from full lengths for whatever purpose shall be moved and installed by the Contractor, as directed by the City without extra compensation.

I. When directed by the City, pipe shall be secured in place by suitable wooden blocking, wedges, or braces; or, if required, a concrete foundation shall be placed.

J. No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the City shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation, unless all required precautions as to the minimum length of open trench and promptness or refilling are observed.

K. Whenever directed, the Contractor shall lay pipe upon an artificial foundation which he shall construct. Such foundation may consist of gravel, sills, wedges, plain, or other timber foundations, or of concrete, all to be of the form and dimensions indicated, and placed in the manner required by the City. All necessary excavation for the construction of artificial foundations shall be made by the Contractor.

L. The minimum cover over water house service connections shall be 4 feet, 0 inches.

### **3-11. CONNECTIONS TO EXISTING WATER MAINS:**

A. Water main connections will be made as indicated on the plans.

B. The Contractor shall obtain written approval from the Engineer and the City of Westminster of the time at which such connection may be made.

C. The City may withhold or rescind its approval, if in its judgement, the Contractor is not prepared with labor, tools, machinery and pump to complete the connection with all possible speed.

D. The Contractor shall not be entitled to any claim for additional compensation for any delay in receiving approval for such connections or if it is necessary that the water connections be made at a time other than the normal working day.

### **3-12. FIRE HYDRANT CONNECTIONS:**

A. Fire hydrant connections of six (6) inch C.I.P. or D.I.P. shall be laid at the points shown on the drawings and shall be extended to such a point as shall be designated. They shall be laid in all particulars in a similar manner to the water mains themselves.

B. Fire hydrants shall be placed where shown on the drawings. Each hydrant shall be set exactly plumb and at the grade given by the Engineer. Care shall be taken to place the steamer outlet normal to the street line and any hydrants placed askew shall be reset, if required by the City.

C. The hydrant shall be firmly set on a bed of screened gravel, which shall extend down 1 foot below the bottom of the hydrant and be filled around it. The total amount of gravel used shall be not less than 1/4 of a cubic yard. The hydrant shall be firmly braced at the back, opposite the inlet pipe.

D. Aggregate for bedding and draining of the hydrants shall be No. 57.

### **3-13. BUTTRESSES AND ANCHORAGES:**

A. Buttresses shall be placed behind all caps, horizontal bends and branches, and anchorages shall be placed beneath all vertical bends. These buttresses and anchorages shall be of concrete and steel, as required. They shall extend to a minimum of 3'-0" of solid, undisturbed soil and shall be constructed in accordance with standard details.

B. Concrete shall bear on the pipe fittings and shall be kept behind the bell. All drains must be kept clean of concrete during the pouring.

C. Concrete buttresses shall be truck mix No. 1 (SHA Specifications).

D. Concrete splashed on bolts is to be removed. Bolts and nuts are to be kept clean and free of concrete.

E. For fire hydrants number 57 stone is to be placed to 3 inches above drain holes, stone to be covered with plastic.

F. If concrete buttresses cannot be installed, anchorage will be determined by the City's Construction Inspector.

### **3-14. DEFECTS TO BE MADE GOOD:**

A. If, at any time before the completion of the Contract, any broken pipes or any defects are found in the water mains or in any of their appurtenances, the Contractor shall cause the same to be removed and replaced by proper material and workmanship, without extra compensation for the labor and material required, even though such injury or damage may not have been due to any act, default or negligence on the part of the Contractor. All materials shall be carefully examined by the Contractor for defects just before laying and any found defective shall not be placed in the line.

B. All materials shall be inspected as to condition by the City on arrival and upon approval by the City, such materials shall be under the charge of the Contractor and he shall be solely responsible for them until they are placed in position, tested and accepted. All materials broken during handling

shall be replaced by the Contractor. The Contractor shall use skilled men for the work of lifting, moving, and transporting materials and shall exercise care in protecting the coating of the pipe and valves, the mechanism of the valves, hydrants, etc.

**3-15. STERILIZATION AND FIELD TESTS OF PIPING:**

A. General: The Contractor or parties installing pipe and appurtenant units shall disinfect and test all pipe installed under this contract in the presence of the City and as hereinafter specified. All defects revealed by the tests, as well as damage to adjacent connected valves, etc., which, in the opinion of the City, needs correction, shall be made good by replacement and/or repair, and tests shall be repeated until all piping systems are shown to be tight to the degree hereinafter specified. Piping shall be tested and sterilized in sections as the City may direct.

B. Disinfection: All newly installed mains shall be disinfected in accordance with ANSI/AWWA C601. Following chlorination, the main shall be flushed as soon as possible (within 24 hours) since prolonged exposure to high concentrations of chlorine might damage the asphaltic seal coat.

C. Hydrostatic Testing: The testing methods described in this section are specific for water-pressure testing. These procedures should not be applied for air-pressure testing because of the serious safety hazards involved.

D. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.

1. Test pressure restrictions. Test pressures shall:

a. Not be less than 150 psi at the highest point along the test section.

b. Not exceed pipe or thrust-restraint design pressures.

c. Be of at least 2 hour duration.

d. Not vary by more than + 5 psi (0.35 Bar) for the duration of the test.

2. Pressurization. Each test section of pipe shall be filled with water slowly and the specified test

pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City. It is good practice to allow the system to stabilize at the test pressure before conducting the leakage test.

3. Air Removal. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the City.

4. Examination. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until it is satisfactory to the City.

#### E. Leakage Test

1. The leakage test shall be of 24 hours duration, at a pressure not lower than 150 psi at the highest point along the test section.

Leakage shall be defined as the quantity of water that must be supplied into the test section to maintain pressure within psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

Allowable leakage shall be determined based on 11.65 GPD, per mile, per inch nominal diameter.

When hydrants are in the test section, the test shall be made against the closed hydrant.

When valves are in the test section, the test shall not be made against the closed valve, but a length of pipe shall be laid beyond the valve and capped and buttressed for the test.

Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified above, the contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

All visible leaks are to be repaired regardless of the amount of leakage.

F. Bacteria Test: Following flushing operations and prior to tying newly installed pipes into the existing distribution system, a sample must be drawn from the new pipe in the presence of the City Construction Inspector for a bacteria test. Negative test results must be submitted to the City from a certified laboratory before any new pipes can be tied into the existing water system.

### **3-16. LOCATION MARKER FOR HOUSE SERVICE:**

A 2" x 6" board shall be placed to mark the end of house service connections. The board shall extend from the invert of the pipe to a minimum of 2 feet above grade and shall be marked WHS.

### **3-17. WATER CONSTRUCTION STAKEOUT**

The Department of Planning and Public Works will require the stakeout Engineer to follow standard details. Standard procedure for all public water shall be:

1. Stake at 50 foot intervals on 10 foot offset.
2. Stake at each fitting with elevation 10 foot offset.
3. All water main stakeout is to be to invert, and not to top of pipe.
4. Stake at five foot offset with water house connections.
5. Fire hydrants shall have 10 foot offset with cut given to the bury line elevation.
6. Stake with elevation at any abrupt change in profile grade.

- SECTION 4 -

SANITARY SEWERS

4-01. GENERAL:

A. The Contractor shall construct sanitary sewers and sewer house connections and appurtenances of the kinds, of the sizes, to the lines and at the elevations shown on the drawings.

B. No measurement will be made of the work described under this Section. Its cost shall be included in the lump sum price bid in the proposal.

4-02. MATERIALS:

A. Ductile Iron Pipe Fittings

1. Pipe shall be in accordance with all the requirements of the ANSI A21.51 and AWWA C151 except that the metal thickness shall be as tabulated herein or increased as required. Pipe nominal lengths may be 16, 16-1/2, 18 or 20 feet.

2. 8" ductile iron pipe furnished by the Contractor shall be Class 50, 0.27" wall thickness, 9.05 inch outside diameter for all sanitary sewerage installations.

3. All pipe fittings shall be designed and constructed to withstand all external pressure caused by over-burden indicated on the profile, traffic loads or any other loads to which the pipe may be subjected. Thickness shall be increased if required due to a change in laying condition or due to excessive cover. Design thickness shall be determined from ANSI A21.50 and AWWA H3-70.

4. Pipes shall have mechanical joints or rubber gasket push type joints. Fittings shall have mechanical joints only. All joints shall be in accordance with the latest ANSI, AWWA and Federal Specifications.

5. All fittings shall be designed and constructed to withstand a pressure not less than that for the adjacent pipe. Gray iron fittings may be substituted if ductile iron fittings are not available. Fittings 12 inches and smaller shall generally be Class 250 or Class D. Those 16 inches and larger shall generally be Class 150 or Class B.

6. All pipe and fittings shall be cement-lined standard thickness. This lining shall be sealed with a bituminous seal coat. The outside surface shall be bituminous coated.

B. Vitrified Clay Pipe and Fittings for Sewer and Sewer House Connections (V.C.P.X.) will not be accepted by the City.

C. Polyvinyl chloride pipe and fittings for sewer and sewer house connections (PVC)

1. This Material Specification covers the furnishing of PVC sewer pipe in nominal diameters 4 inches through 27 inches for use in sanitary sewer projects as designated on project drawings.

2. All PVC sewer pipe shall be manufactured by a member in good standing of the Uni-Bell PVC Pipe Association. The pipe shall be manufactured in accordance with one of the following Standard Specifications:

a. ASTM D 3034 and SDR-35 "Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings"

b. ASTM F 679 "Standard Specification for Polyvinyl Chloride (PVC) Large - Diameter Plastic Gravity Sewer Pipe and Fittings"

3. All PVC pipe joints shall be, gasket, bell and spigot, push-on type conforming to ASTM D 3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals". Since each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and purchased as such. Pipe shall be manufactured by Bristol Corporation (Bristolpipe) or Certainteed Corp. or approved equal.

4. Fittings for PVC gravity sewer pipe shall be fabricated from pipe meeting the respective ASTM PVC pipe standard or molded PVC. The wall thicknesses of the waterway and bell of molded fittings shall be no less than the respective minimum thicknesses for the equivalent pipe. Fittings shall be manufactured by the Harrington Corporation (HARCO) or Certainteed Corporation or approved equal.

All fittings shall be compatible with the pipe to which they are attached.

5. All PVC pipe shall be marked in accordance with the applicable ASTM Standard Specification. Intervals shall not exceed 5 feet.

6. The contractor shall provide test reports duly certified by the manufacturer's testing facility or an approved testing laboratory of full compliance with the applicable ASTM standard specification. Pipes may be rejected for failure to comply with any requirement of this specification.

D. Sanitary Sewer Manholes and Miscellaneous Structures

1. All sanitary manholes shall be constructed of pre-cast reinforced concrete.

2. Pre-cast Reinforced Concrete Manholes shall conform to the standard details and shall meet the requirements of ASTM Specification C-478. The manholes shall be constructed in accordance with the Manufacturers recommendations. Manholes of tongue and groove construction without rubber gaskets will not be permitted. The openings in the wall of all pre-cast manholes shall have a flexible gasket such as an A-Lok gasket or approved equal.

3. The bottoms of sanitary sewer manholes may be built of SHA Mix No. 1 concrete if the Contractor so desires. Concrete slabs for shallow manholes shall be SHA Mix No. 2 concrete. Special care shall be taken in laying brick in inverts of manholes, transition sections, junction chambers and similar construction to insure a smooth flow through the sections.

4. 48-inch diameter manholes shall be built on sewers 6-inch to 24-inch inclusive.

5. Drop connections, of the types shown on the Standard Details shall be built by the Contractor where shown on the drawings or where directed.

E. Brick

1. All bricks used for the lining of channels shall conform to the same ASTM Specification for Grade SA.

2. All brick shall be new and whole, of uniform standard size, and with substantially straight and parallel edges and square corners. Bricks shall be of compact texture, burned hard and entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No salmon

brick shall be used in any part of the work. Brick shall be culled after delivery, if required, and no culls shall be used except at such places, to such extent, and under such conditions as may be allowed by the Engineer.

3. The bricks, after being thoroughly dried and then immersed in water for 24 hours, shall not be increased in weight, on the average, by more than 10 percent; and any shipment of brick not satisfactorily uniform from this standpoint, or any bricks found to absorb a materially greater amount of water, will be rejected.

4. The Contractor shall furnish the City with at least 5 bricks of the character and make he proposes to use, at least one week before any bricks are delivered for use. In case the samples submitted fail to meet the specified requirements other samples shall be furnished, until a satisfactory brick is found. All brick used shall be of the same quality as the accepted samples. In case the City is satisfied that 1/4 or more of any consignment of brick will not meet the specifications, the whole shipment may be rejected.

#### F. Mortar

1. Unless otherwise specified, all mortar shall be composed of Portland Cement and sand of the quality and character as provided under these specifications. For brick or concrete block masonry the proportion by volume shall be one part of cement to two of sand. One volume of cement shall be one bag, or 94 pounds net. One volume of sand shall be 0.9 cubic feet, the same not being packed more closely than by throwing it into a box in the usual way.

2. Cement shall be in accordance with Standard Specification for Portland Cement ASTM Designation C150-68 for Type I.

3. Sand for mortar shall be screened to reject all particles of a greater diameter than 1/4 inch and shall not contain more than 5 percent by weight of a very fine material.

4. Mortar shall be mixed in small batches freshly for the work in hand. Tight boxes or platforms, made for the purpose, shall be used. The sand and cement shall be thoroughly mixed dry, in the proper proportions, until a uniform color has been produced, whereupon a moderate amount of water shall be added, so as to produce a stiff paste of the proper consistency for the work at hand.

5. Measuring the mixing of mortar shall be done, at all times, in an exact and thorough manner. Machine methods of mixing may be employed if approved by the Engineer.

6. No mortar shall be used that has stood for more than 30 minutes after being mixed, and all hard or otherwise damaged mortar shall be removed from the work. Retempering of mortar will not be permitted.

7. Special and approved precautions shall be taken in the use of mortar during freezing weather.

#### G. Frames, Covers and Steps

1. Manhole and vault frames, covers and steps shall be furnished by the Contractor and set by him as the work progresses. Frames shall be well bedded in mortar. Steps shall be spaced vertically and staggered as shown on the standard detail drawings and set to provide a minimum of 6 inch tread. All steps shall be galvanized wrought steel 3/4 inch diameter, with hooked ends, and as shown in standard details. All frames and covers shall be in accordance with the Standard Specifications for Gray Iron Castings ASTM Designation A 48 for Class No. 30. Manhole cover shall have wording in raised letters as shown on the Standard City of Westminster Sanitary Sewer Details included in the plans.

2. All manhole frames and covers for sanitary sewers shall be installed with a "rainstopper" watertight insert or equal.

#### H. Blank Connections

1. Blank connections or stubs, not less than 16 inches in length, for future extensions shall be built into manholes where shown on the drawings or where directed by the City. These blank connections or stubs shall be constructed so as to be free from any leakage. The blank connections or stubs shall be built flush with the inside wall of the manhole or inlet and the stopper for same shall be constructed so as to be easily removed.

2. Concrete for pipe cradle shall be Mix No. 1 (SHA Specification).

#### I. Cleanouts

1. Standard cleanouts shall be installed in accordance with the 'Standard Details' Sheet.

#### 4-03. CONSTRUCTION METHODS:

A. Trench Excavation and Tamped Backfill shall be performed in accordance with Section 1 herein.

B. All sanitary sewer pipe shall be cradled in SRC #6/ASTM #57 crushed stone at all locations "to the full width of the trench". The stone cradle shall extend up to 1 foot over the top of the pipe and be firmly compacted to prevent crushing the pipe during backfilling with a minimum depth of 4 inches under the pipe.

##### C. Laying Pipe

1. Each length of pipe shall be carefully inspected by the Contractor for possible defects before laying. The pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed work. The upper ends of all pipe lines shall be provided with a carefully fitted stopper, to prevent the entrance of dirt and other substances.

2. Pipe shall be carefully handled at all times and laid true to line and grade. Bell holes shall be dug sufficiently large to insure the making of proper joints and to provide a firm solid bearing for the entire length of the barrel of the pipe.

3. Special care shall be taken to insure that each length abuts against the next in such a manner that there will be no shoulder or unevenness of any kind along the inside of the bottom half of the pipes as laid.

4. Before joints are made, each pipe shall be well bedded on a stone cradle foundation as specified above and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. After pipes have been laid, there shall be no walking on or working over them, except such as may be necessary in tamping, until there is a covering at least 2 feet in depth over their top. After joints have been made, the greatest care shall be used not to disturb or damage them during the refilling process, or at any other time.

5. The excavations in which pipe is being laid shall be kept free from water. No water shall be allowed to rise over or run through the pipe while any joint is being made, nor until after it has thoroughly set. Any defects due to settlement shall be made good by the Contractor at his own expense.

6. Whenever a pipe requires cutting to fit into the line or to bring it to the required locations, the work shall be done in a satisfactory manner so as to leave a smooth end, and without extra compensation.

7. House connections shall enter the sewer through an approved connection and shall be placed at such depth as may be directed by the Engineer and as indicated by the plans.

8. No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the City shall deem that there is danger of the formation of any ice or the penetration of frost at the bottom of the excavation, unless all required precautions as to the minimum length of open end trench and promptness of refilling are observed.

9. All concrete required to support and reinforce Y-branches and bends shall be placed as shown on the standard details or as directed by the City.

D. Connections to Existing Sewers

1. The Contractor shall make all connections to the existing City sewers of whatever nature without additional compensation. However, the Contractor shall obtain the City's approval for time at which such connection may be made. The Contractor shall not be entitled to any claim for additional compensation for any delay in receiving approval for such connection.

E. Wyes

1. Standard wyes with 6 inch branch shall be installed at each residence as shown on the drawings and in the standard details. The wyes shall be set at such vertical angle as shall be necessary to bring the house connection at the proper depth. In general, this angle shall be from 30 to 45 degrees, measured from the horizontal. The length of Y-branches shall be as required to bring branches to the road right of way line.

2. Where the house connection would otherwise be too deep, the branch of the Y shall be placed vertically, and if required, the house connection connecting therewith shall be built to such vertical height as may be directed before leaving the sewer trench. The change of direction at the upper end of the standpipe shall be made by a single or double Y-branch, for the purpose of connecting respectively one or two house connections thereto.

F. Sanitary Sewer Manholes and Miscellaneous Structures

1. The Contractor shall install manholes, vaults, drop connections, cradles and encasements and such other miscellaneous structures, as may be required, at such points on the pipe lines and of such form and dimensions as are shown on the drawings, the standard details or as may be otherwise specified or directed. All manholes and vaults shall be carried up to such point above or below the ground surface, as the Engineer shall in each case require.

2. Channels for receiving the passing sewage shall be formed in the bottom of the manholes as directed. All such channels shall be lined with brick or with split vitrified or concrete pipe, or formed concrete.

3. Wider and/or deeper foundations, than shown on the standard details for these structures, shall be built of pre-cast reinforced concrete wherever directed or specified.

4. These various structures shall be installed as pipe laying progresses and the Engineer may stop work entirely on the laying of pipe until the structure just passed has been completed.

G. Mirror Test

1. The City, upon completion and before backfill of any portion or all of the sanitary sewers under the Contract, will conduct a mirror test on all sewers for defect, alignment and grade. Exfiltration and infiltration tests of water in sanitary sewers will be conducted as described in paragraph entitled "TEST FOR WATER LEAKAGE".

H. Test for Water Leakage

1. Tests shall be made on all portions of the sewers built under the contract. The Contractor shall cooperate and furnish all assistance necessary to perform the tests as specified herein and as directed by, and under the direction of the Engineer.

I. Air Test of Sewers for Acceptability

1. The testing for acceptance of gravity sewers shall be the low pressure air test whereby the pipeline ends are plugged, and compressed air is gradually introduced into the section under test. The measure of acceptability of sewers by this tests method shall be the recorded time elapsed in seconds for the internal pipeline pressure to

drop one pound per square inch (1.0 psi) or lose two cubic feet of air per minute (2.0 cfm) for the tested section lengths with compensations being made for the permeability of the pipeline wall thickness and temperature. The Contractor is responsible for furnishing all necessary components such as plugs, compressors, and accessories including leak detection equipment and all necessary approved safety measures to protect life and property for this test. Sections which do not meet the acceptance test specified herein shall be repaired or replaced and retested until such acceptance can be made. The design guide specification of this test is the "Journal of the Sanitary Engineering Division," Proceedings of the American Society of Civil Engineers, pages 1 to 29 inclusive, dated April 1964 as authored by Roy E. Ramseir, F., ASCE and George C. Riek, A.M., ASCE.

2. The Contractor is responsible for furnishing compressed air at a pressure not to exceed 15 pounds per square inch (15 psi) to portable calibrated test panel board. The Contractor will furnish the necessary instrumentation to perform the required measurements related to the test and the necessary forms to record the data. The section, length or lengths of sewer to be tested at one time shall, in general, be mutually established by the City and the Contractor. In no case shall the test lengths exceed those lengths tabulated herein.

Once the air test is started it shall be completed on that working day. In no case shall test plugs or pressurized sewers be left to stand unattended over night or over the weekend.

3. The air test procedures to be followed are:

a. Isolated Pipe to be tested. The section of pipe to be tested is plugged at each end. The ends of all branches, laterals, and wyes which are to be included in the test are plugged. All plugs shall be carefully braced to prevent slippage and blow-out due to the internal pressure. One of the plugs provided must have an inlet tap or other provision for connection to the 1/2 inch diameter air hose and relieving the tested section.

b. Connect Equipment - Connect one end of an air hose to the plug used for the air inlet. Connect the other end of the hose to the portable air control equipment. This equipment consists of valves, meters and pressure gauges used to control the rate of air flow to the test section and to monitor the

air pressure inside the pipe. Connect an air hose between the compressor (or other source of compressed air) and the control equipment.

c. Add Air - Supply air to the pipe section. Monitor the air pressure so the pressure inside the pipe does not exceed 5.0 psig. A pressure relief valve is required in order not to damage the installed pipeline or calibrated test panelboard.

d. Stabilize - When the pressure reaches 4.0 psig, throttle the air supply so the internal pressure is maintained between 4.0 and 3.5 psig for at least 2 minutes. During this time check all the plugs with soap solution to detect any plug leakage. If plugs are found to leak, bleed off the air, tighten the plugs, and repeat again the previous test procedures.

e. The determination of rate of air loss shall be made by employing the flowrator method or the stopwatch method at the Contractor's option. With both methods, air is supplied to the pipe test section at a rate whereby the internal pressure is maintained at 3.0 psig. The air flow rate, and pressure are read and recorded in cubic feet per minute and psi respectively. The air flow rate is then corrected for temperature and groundwater level. This data is then recorded in cubic feet per minute under standard condition of 14.7 psi and 68 degrees F. A time lapse of 2 to 5 minutes is normally required for the internal compressed air temperature to stabilize itself within the pipeline. With the stopwatch method, and after the internal compressed air has been allowed to stabilize for the specified time, the air supply is closed off with the pressure being allowed to decrease slowly to 3.5 psig. At 3.5 psig the stopwatch is started and the precise time elapsed is recorded for the pressure to drop to 2.5 psi. From this recorded time required for the pressure loss of 1.0 psig at an average pressure of 3.0 psig, the computed rate of air loss can be determined. The internal pipeline temperature is to be recorded in the appropriate space on the forms maintained by the Engineer.

4. If the air temperature within the pipeline, after the 2 to 4 minute stabilization period, differs from standard temperature (68 degrees F), an appropriate correction factor shall be employed. This temperature correction factor (Ft) shall be as tabulated below:

| <u>Degrees<br/>Fahrenheit (F)</u> | <u>Temperature Correction<br/>Factor (Ft)</u> |
|-----------------------------------|---|
| 0                                 | 1.148   |
| 32                                | 1.073   |
| 68                                | 1.000   |
| 100                               | 0.943   |

a. To adjust the allowable time for the pressure drop to decrease from 3.5 psig to 2.5 psig, with a compensation being made for temperature, multiply the allowable time tabulated by the correction factor (Ft).

5. If the normal groundwater table is encountered above the crown of the pipe at the start of construction, a suitable allowance of this back pressure condition shall be made. In order to make this back pressure correction a pilot pit or augered hole shall be dug at least 5 feet uphill of the centerline of the pipeline and midway between the limits of the test section. This pilot hole shall be dug or augered at least 24 hours prior to the start of the air test.

Prior to starting, the elevation of the groundwater is to be determined. This elevation is compared to the arithmetic average elevation of the inside crown of the test section and then converted to psi to back pressure to be added to the standard test. This is to compensate for the groundwater effect upon the air test and recorded in the appropriate place on the test form.

6. Safe practices shall be strictly adhered to during the air testing of sewers. Due to the large magnitude of internal force being applied to plugs and stoppers at pipe ends, it is essential that these plugs and stoppers be firmly and adequately braced and buttressed. After starting the test, an interruption of the test procedures shall be made to apply a spray type foamable soap solution to all plugs and stoppers in order to ascertain whether there are any leaks. If leaks are evident they shall be corrected before proceeding further. This corrective procedure necessitates slowly bleeding off the pressure before adjustment of the closures and repeating operations.

7. Automatic pressure relief valves shall be installed on the air flow piping to safeguard the workmen and installation from excessive pressures with attendant blow-outs. Air receiver tanks and pressure reducing valves shall be installed to reduce compressor pressures to the specified limits described in the test procedures.

8. If the sewer lines tested by the low pressure air test specified herein are found to be not acceptable due to their inability to maintain the specified pressure for the tabulated times, they shall be immediately and totally replaced with new materials at no expense to the Owner.

The pipeline under test shall be considered acceptable, when tested at an average internal pressure of 3.0 psi greater than the average back pressure of any groundwater that may submerge the pipe, if:

a. The total rate of air loss from any section tested in its entirety does not exceed 2.0 cubic feet of air per minute, or

b. The section of pipeline under test does not lose air at a rate greater than 0.0030 cubic feet of air per minute per square foot of internal pipe surface area, or

c. The time elapsed or minimum holding time, in sections, after temperature stabilization that is required for the internal pipeline pressure to drop from 3.5 psig to 2.5 psig shall not exceed the values for the various pipe sizes, lengths and combinations as specified in the tables available from the most current publication of the National Clay Pipe Institute.

9. Any leaks which the Engineer deems to be of importance and any sections of the line in which the leakage exceeds the allowable shall be repaired by the Contractor, at his own cost and expense, to the complete satisfaction of the City.

10. All labor, tools, materials and equipment for testing shall be furnished by the Contractor.

11. After successful completion of the elevation and alignment checks but prior to performing the specified air test, sewers shall be cleaned of all construction debris to the complete satisfaction of the Engineer.

12. The disposal of all debris and water shall be in accordance with approved procedures and shall be the full responsibility of the Contractor. Debris shall be hauled away from the site to an approved disposal area and water shall be carefully disposed of in the natural water-courses in an approved manner. In no case shall test waters be of excessive quantity which shall create erosion or damage and shall be disposed of in a manner

which will not cause any damage to public or private property owners adjacent to or downstream from the work. Any such litigation resulting from disposal methods used shall be the full responsibility of the Contractor.

13. The pipeline and all branches within the test section shall be cleaned by passing a snug fitting inflatable ball of the same diameter as the pipeline and passing this through the pipeline using water as conveyance force medium. The ball is to be furnished with a recoverable tag line. The ball shall be inflated to a snug "piston fit" and placed into the pipe at the upper manhole or lateral house connection end. The plug from the previous air test of the upper pipe section shall be left in place in the manhole or pipe end previously tested. Water shall then be employed to create sufficient head to force the ball through the pipe. Clean potable water for such tests shall be provided by the Contractor.

14. If the passage of the ball is impeded by an obstruction in the line or near the manhole, appropriate corrective measures shall be taken to clean the line. In addition to the foregoing, the small amount of controller leakage on the circumference of the ball is intended to act as flushing water to clean the internal pipe wall. The balling test shall be made before the air test and permit the City to integrate into their system a clean sewer, free from dirt and obstructions. In no case shall air tests be conducted before the ball flow test, as the wetting operations to the pipe wall are essential in the performance of subsequent air tests.

#### J. Air Testing - PVC Pipes

Except as provided for hereinafter, the air test shall be carried out as previously specified.

The recommended time requirements for a 0.5 psig pressure drop from 3.5 psig to 3.0 psig shall not be less than the times shown below.

| <u>Pipe Size (inches)</u> | <u>Time</u>    |
|---------------------------|----------------|
| 4                         | 2 min. 32 sec. |
| 6                         | 3 min. 50 sec. |
| 8                         | 5 min. 06 sec. |
| 10                        | 6 min. 22 sec. |
| 12                        | 7 min. 39 sec. |

Should any test on any section of pipe line disclose an air loss rate greater than permitted, the Contractor shall, at his own expense, locate and repair the defective joints or pipe sections. After the repairs are completed, the line shall be retested until the air loss rate is within the specified allowance i.e. the pipe line holds the pressure within the allowable pressure drop of 0.5 psig for a minimum time equal to the time(s) shown above.

K. Deflection Testing - PVC

Any one of the following two methods may be used to measure vertical deflection.

A. Electronic deflectometer

B. Rigid "Go-No Go" device

The most common and least expensive method is described below:

Method for use of a Rigid "Go- No Go" device.

A. Ensure that the line is clean and free of debris that might cause the device to jam. If necessary clean the line using a hydro-cleaner washing in the direction of flow.

B. Insert pull line thru pipe to be checked.

C. Pull gauge thru pipe by hand using pull line. Gauge should have a line attached to both sides to facilitate removal should the gauge become jammed.

D. When it appears that the gauge will not go forward, record the distance from the manhole at which the gauge is stuck and remove gauge. Do not use mechanical equipment to force the gauge through the pipe.

E. Correct the problem causing the gauge to jam and retest until gauge passes thru pipe.

F. Once gauge has passed through pipe, the pipe will be deemed to have passed the deflection requirement.

G. The Gauge shall be of design and construction as approved by the City.

#### L. Sewer Line Lateral Markings

1. The location of the ends of the sewer line laterals for house connections shall be clearly marked by placing a 2" x 6" board upright and extending from the invert of the lateral to at least two feet above grade. The boards shall be marked "San.H.C." and shall be protected during further construction operations in the area until such time that the house connections are completed. In addition, a cross cut shall be placed on the top of curb at the point of its crossing of the sewer laterals for use as a reference location in the future.

#### 4-04. SEWER CONSTRUCTION STAKEOUT:

The Department of Planning and Public Works will require the stakeout Engineer to follow standard details. Standard procedure for all sewer projects shall be:

##### A. Sewer lines and manholes stakeout.

1. Use 10 foot offset for pipe runs. Place a stake at 0 + 25 on all runs, then at 50 foot intervals beginning at 0 + 50.

2. Place a stake (10 foot offset) at each sewer house connection (S.H.C.) wye on the main line. No elevation is required on S.H.C. wyes.

3. Place a stake on the actual end of the S.H.C. at the road right-of-way line (again elevation is required on this stake). Place at five foot offset, one (1) stake which gives the lot number, cut and grade of the lateral. Lateral grades need be shown only where the grade is not two percent (2%). This five foot offset stake shall be perpendicular to the line of the lateral.

4. Manholes to be staked on 10 foot offset from each pipe run. Offset stake must give invert and top elevation for each manhole.

- SECTION 5 -

**ROADWAY AND STORM DRAIN CONSTRUCTION**

**5-01. GENERAL:**

A. The Roadways and Storm Drains detailed on the construction drawings, shall be constructed to the sizes, grades and elevations shown.

B. Roadways and Storm Drains under this Contract shall be constructed in accordance with the STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION, dated January, 1982 and subsequent amendments, addenda and errata, which are hereby made a part of these Specifications insofar as the STATE ROADS SPECIFICATIONS are applicable and as modified by the amendments and explanations listed herein. Unless otherwise noted, references to standard details shall be those of the State Highway Administration.

C. Typical paving sections are shown on the Contract Drawings for each separate roadway.

D. No measurement will be made of the work described in this Section. Its cost shall be included in the lump sum price bid in the proposal. The cost for sediment control for this section of work shall be included in the Lump Sum Bid.

**5-02. CONSTRUCTION METHODS:**

**A. Subgrade Preparation**

After the installation of utilities under this Contract, the subgrade of all roadways shall be at the established subgrade elevation within a tolerance of 2 inches for the full width of the road or street right-of-way.

**B. Sequence of Construction**

After the installation of utilities, the base course and concrete curb and gutter shall be constructed and then maintained for a period of at least 60 days unless otherwise directed by the Owner or the Engineer. After the maintenance period has ended, the base course shall be cleaned of all foreign material and approved by the Engineer before the bituminous course is placed.

C. The Contractor shall thoroughly review the plans before submitting a bid. If clarification is needed concerning any work tasks shown thereon, the Contractor shall consult with the Engineer for clarification.

**5-03. STORM DRAIN SYSTEM:**

A. The Contractor shall furnish and install all materials to construct the storm drain system and all required appurtenances at the locations and to the lines, slopes and elevations shown on the Contract Drawings and as specified herein.

B. Trench excavation, backfill and protection for Storm Drain System where applicable shall be in accordance with Section 2 of these Specifications.

C. Laying and jointing of pipe where applicable shall be in accordance with Section 602 of the "State Highway Administration Standard Specifications".

D. Storm Drain pipe shall be Reinforced Concrete Culvert Pipe of the sizes and classes shown on the drawings, and be in conformance with the latest Specifications of AASHTO, M-170. Detailed description of RCCP will be found in the "State Highway Administration's Standard Specifications", Section 908.03 page 634.

E. Manhole and vault frames, covers and steps shall be in accordance with Section 4-02, Paragraph G of these Specifications and as shown in the standard details with the exception of raised lettering of the words "Storm Drain".

**5-04 RIP RAP:**

Stone for rip rap, channels, ditches, slopes and gabions shall be in accordance with Section 905 of the State Highway Administration Standard Specifications and shall be installed according to the location and dimensions shown on the Contract Drawings.

**5-05 CURB AND GUTTER:**

A. Curb and Gutter shall be constructed of concrete of the type and style shown on the Contract Drawings.

B. Construction methods and materials shall be in accordance with Section 806 of the State Highway Administration Standard Specifications.

**5-06 ROADWAY BASE AND SURFACE COURSES:**

A. Graded Aggregate Base Course shall be furnished and constructed in accordance with the requirements of Section 304 and Section 903 of the State Highway Administration Standard Specifications and shall be constructed to the depths and widths shown on the Contract Drawings.

B. Bituminous Concrete Surfacing shall comply with Sections 400 and 900 of the State Highway Administration Specifications and shall be constructed to the depths and bands shown on the Contract Drawings.

**5-07 CONCRETE:**

A. The Contractor shall furnish all labor, materials, equipment and services necessary for the final and complete installation of all concrete work, including reinforcing steel, concrete pipe encasement, buttresses and other miscellaneous concrete work, all as shown on the drawings and specified herein.

B. All concrete work for miscellaneous structures shall comply with Section 800 and 900 of the State Highway Administration Standard Specifications.